FARMING WITHOUT CHEMICALS

# The Organic Farmer

NOVEMBER 1950
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**PAUL KEENE – ENTERPRISING ORGANIC FARMER**

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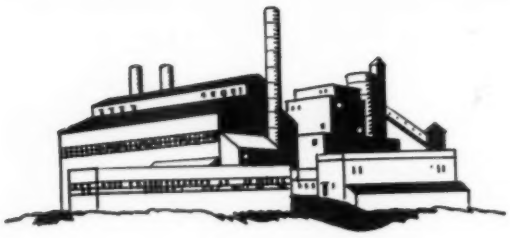

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November, 1950

# *The* Organic Farmer

Farming Without Chemicals

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# Letters

**They've Started Laying Golden Eggs Again**

Dear Sir:

I recently bought some fine white Emden geese for the purpose of keeping the wild grasses down which are harmful to the noses and eyes of my dogs for a few weeks each year. I found that geese are almost impossible to buy and I had to send to Pennsylvania and New York to get any at all. The young goslings came by Air Express.

Although few geese have been raised lately in the U. S., they are in great demand for eating certain weeds in strawberry fields. They are used for this purpose down South and in Washington and Oregon. Up around Seattle geese sell for over $25.00 each and the strawberry farmers will pay $5.00 for one goose egg.

Frederick Preston Search
Robles Del Rio, Calif.

**Good Results With Apples and Pears**

Dear Sir:

I sure don't want to miss a single issue of your wonderful publication. I have used the organic method on 20 of my apple and pear trees the past year and the way they responded is almost unbelievable.

I had two yellow transparent apple trees about five years old that produced around two dozen of the largest and smoothest apples of this variety I ever saw. I used no spray or artificial fertilizer of any kind.

I have one apple tree that I did not treat just to see what the results would be. It was about a year older than the treated ones, but it bore only a dozen little scabby apples that weren't fit to eat.

If this is not convincing proof of the effectiveness of organic methods I don't know what is.

Wilbur Dick
Kennerdell, Pa.

**Virginia Passes Prepaid Rock Phosphate Orders**

Dear Sir:

Some prospective customers of ours are advising that they have read in the January, 1950 issue of *The Organic Farmer* that it is against the law to bring ground rock phosphate into the State of Virginia.

We wish to disagree with you on this statement. It is true that ground rock phosphate is ruled out of the state insofar as the fertilizer law there is concerned. However, this means that it cannot be resold through dealers there.

Our legal department took this matter up with the Commissioner of Agriculture in Virginia, resulting in our being advised that we could make shipments to individuals in that state, provided they paid for the material here in (Nashville) Tennessee before the goods were delivered. Therefore, we have been shipping into Virginia for the past five years on the basis of cash with the order, and so far, there seem to be no complaints.

In closing, it is our opinion that if you want to correct your statement in this previous publication, it might make a few people happier who have been laboring under this false impression.

Doswell Brown, Jr.
Robin Jones Phosphate Co.
Nashville, Tenn.

*Ed. Virginia's Department of Agriculture and Immigration replied, somewhat ambiguously, to an inquiry by one of our readers as follows:*

Dear Sir:

We have your letter of October 24, and note that you are interested in purchasing some Raw Ground Phosphate, for shipment in Virginia.

In this connection we wish to advise that Ground Raw Phosphate is not permitted by law to be registered and sold in this State.

T. F. Hoffman,
Dept. of Agr. & Imm.
Richmond, Virginia

**Vetch Can Be Planted When Cultivating Corn**

Dear Sir:

In the August issue of *The Organic Farmer* I read with much interest the article by William P. Coleman about winter vetch. I note with special interest that vetch can be planted in corn at the time of the last cultivation. I have been searching for some plant of this nature to sow in corn for two reasons: First, to provide some extra feed for livestock in the fall (as when lambs are turned into corn to graze on the lower leaves, and sec-

ond, to provide organic matter to plow under for the next year's crop.

Eldon G. Worsley
Mendota, Illinois

**Forest Soil**

Dear Sir:

That I am a (newly) confirmed believer in the organic way, the following will, or should give good proof.

Since you have recently begun to advocate farming by way of adding anything to the soil directly instead of indirectly, as by composting, which would increase the soil's humus content, I have decided to go a step further than that, by adding the humus already made.

Lately, by digging about over my woods with a hoe, I have discovered that there are humus deposits, just as there are mineral deposits. These deposits are to be found even in unsuspected places, such as on or near the top of a hill. The usual place, however, is near the bottom of a wooded hill where the humus has been washed from above. The soil here is very dark, almost black, and may extend down four to six inches, not including the litter or leaf mold which of course helps hold the humus in check as it gravitates toward the lowest point. Other such places are glades where the soil is sparse and where perhaps only grass has grown for centuries. Here the soil is extremely dark.

Perhaps you already know what I meant by saying I was going to go a step further than you have been advocating for organic farmers. My method simply is to move as much of this humus already made as I can and apply it to the land that is to be tilled. Despite the claim that such material is usually seriously lacking in nitrogen and that it is highly acid, it nearly always is found under a dense growth of grass or thicket of vigorous saplings, which ought to dispel the notion that it will shock plants. As far as the acid is concerned, lime of course would be an effective and simple remedy.

I don't know what you think about this idea of adding what I call made humus to the land instead of moving it to the land while it is still locked up in plants, but I believe that it has *tremendous* possibilities. As I pointed out, this material nearly always abounds near the bottom of a wooded cove, and being so located, the removal of it would not create much danger of starting a gully such as would be the case higher up. I have already experimented enough with this kind of material to see that its effects upon field crops can be good.

I often stopped while searching for this substance and examined it closely for signs of worm excrement. I was amazed to learn that much of the surface of this dark, humic earth is such excrement. Beneath this substance, of course, I found an abundance of earthworms. All this did away with any possible doubt in my mind that this material would


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harm plants in the field, to which I think you would agree.

And the amazing fact is that this rich, humic substance is often found perfectly free for the asking, that is, it is not bound up by anything stronger than grass roots, and can be easily removed. As in the case of it being located in a thicket, however, quite a different story is to be told, as here it is powerfully bound up with a maze of tree roots that hold it firmly in place. Much more work would of course be needed to free it from root-made captivity, but I believe that even this obstacle could be overcome enough to make use of this substance in the field a paying matter.

Of course the idea of taking this material from the forest is somewhat like robbing Peter to pay Paul, and perhaps there are places where the humus had best stay where it is. But, on the other hand, it can be found in quantity in worthless thickets, that is, thickets so dense as to be of little commercial value and which do not promise to ever be. And there are other places from which this humus could come without seriously damaging the area containing or surrounding it.

H. H. Watson
Phil Campbell, Ala.

## Queries and Comment

### Wood Ashes Can Be Harmful

Dear Sir:

I notice that *The Organic Farmer* says that wood ashes are good for the land. Please tell me if there is danger of putting too great quantities of wood ashes on the soil.

A. J. Roberts
La Mesa, Calif.

*Ed. Wood ashes are a good fertilizer,*

*but they are quite similar to the soluble chemical fertilizers in the way in which they act. Potash, which is the main nutrient element in wood ashes, is contained in soluble form. Therefore, it is best to be extremely careful as to how wood ashes are used. Too great quantities will kill young roots, and will probably discourage earthworms.*

**Cherries Rot in Clusters**

Dear Sir:

We have a sweet cherry tree in our yard. The cherries on it are yellow and nice and sweet, but they rot in clusters. Would you tell us what to do? Also, the limbs are dying on it. We hate to use spray if we can do without it. The tree is only about eight or nine years old.

Mrs. James E. Bull
Chester, Pa.

*Your cherry tree is suffering from brown rot, which is an easy disease to control without the use of sprays. Brown rot is caused by a fungus which is carried up the tree by ants or splashed up by falling rain. It is important to remove all affected fruit as soon as possible and to prune the tree so that it is properly aerated. Clean the soil around the base of the tree and mulch it carefully. Mulching is an important measure to take in brown rot control. One experiment station found that mulches controlled rot in roses. You might also ring the tree with a sticky substance to prevent ants from reaching the branches.*

**Disease Is a Part of Nature's Plan**

Dear Sir:

On page 251 of the Summer issue of *The Land* is expressed a thought which has come to me several times while reading the argument about the control of disease in plants by using the organic method of farming. Can you answer the question, "Why is there disease among forest trees?"

Robert E. Baylor
Chuquicamata, Chile

*Ed. Disease has been present in nature since almost the beginning of time and there is no doubt that it will always be with us. And there are always runts – both plant and animal – that are of weaker constitution than others of their kind and are subject to disease. It is in the weak organisms that diseases in a pure state of nature flourishes and perpetuates itself. And one can always find weaker than average organisms, even in a state of untouched nature.*

*Sure there is disease in the forest. Trees are affected by insects and succumb to various fungus and degenerate disorders. The reason for that disease is explained above. But, any orchard man will tell you that his fruit trees are much more subject to disease and insect attack than are the trees in the forest. In fact, many*

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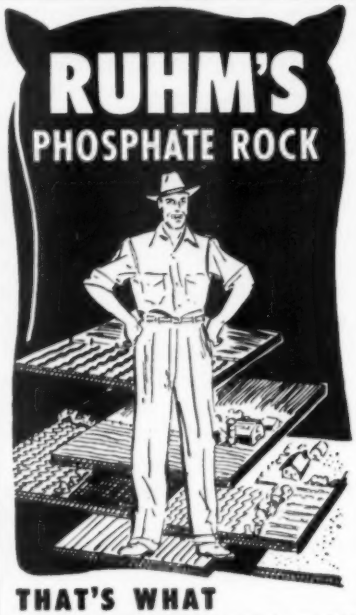


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*orchard trees just won't live if you don't spray them; I am referring to trees raised on poor and chemicalized soil. Even if you grow a tree organically you will not be able to stop spraying immediately without the health of the tree suffering. Spraying must be gradually stopped. And some varieties are more sturdy and can withstand insect attack better. On the other hand, some varieties of trees and plants are weak and can not withstand insect attack even when grown organically.*

### Raising Sunflowers

Dear Sir:

What kind of sunflower seed is the best for Oklahoma and when is the proper time to plant this crop?

Howard White
Atoka, Oklahoma

*The mammoth Russian variety is the most popular type of sunflower in many sections of the country, and it will grow well in Oklahoma. You may buy the seed from any local specialty seed house or from the Nu-Meal Mills, Apple Creek, Ohio. You may also be interested in trying some of the new hybrid sunflowers with smaller heads and stalks. They are easier to harvest.*

### Good Land or Bad Land?

What is my best buy? Should I buy "run-down" or undeveloped land at a price and develop it or should I start on "good" land at a higher price?

H. H. Botkin,
Harriman, Tenn.

*Ed. The type of land you choose to work with depends largely on your finances. You will never make a mistake by buying good land. However, you may want to buy run down land if you can get it cheaply. The main expense in revitalizing it by the Organic Method is in labor. Most organic fertilizers and mulches can be secured cheaply.*

*However, you should make sure that the land you buy is not poor geologically. If soil has never been suitable for crops it may be difficult to make productive.*

### A Manure Handling Problem

Dear Sir:

We are accustomed to piling the winter supply of manure from the cattle in the field and spreading it in the spring when it can be worked into the soil. Some of our neighbors claim that when the manure is so piled the nitrogen is lost.

They spread their manure on top of the snow and frozen soil which is quite often two or three feet thick. Our land here is rather hilly and it seems to me that most of the manure spread this way is washed off when the snow melts.

What is your opinion?

Richard Nelson,
Eleva, Wisconsin

*Ed. You are getting more value from your manure than is your neighbor who spreads it on top of the snow. It is essential to disk in or otherwise cover manure that has been spread. It loses twenty per cent of its value within a few hours of exposure. If left on the surface for several days it loses eighty per cent of its value. However, your manure loses quite a bit of its value by being exposed to the elements in piles. It should be stored in a protected location.*

### Where to Buy Open Pollinated Corn

Dear Sir:

In the June issue of *The Organic Farmer* you have an item by Ernest M. Halbleib comparing hybrid corn with open pollinated corn. He mentions Krug open pollinated corn. Please let us know where we could get some of this corn for seed as we would like to try some.

Golden Green
Sanborn, Minnesota

*You may be able to get Krug corn from the Hoffman Seed Company, Landisville, Pennsylvania.*

# With the Editor

## Is the organic method more expensive?

**By J. I. RODALE**

MORE farmers would change over to the organic method if they were aware of several facts. First – the organic method is not more expensive than the present method of farming. If anything it is less expensive. Second – it does not result in reduced yields. On the contrary, it increases the productive capacity of the land. I am going to deal here with the first item above – Is the organic method more expensive than the one that uses chemical fertilizers? But before we can discuss it, let us review what the organic method is.

In many applications it is similar to the chemical method – that is, there should be grown as many green manure crops per year as possible, crops should be rotated each year and the farmer should do everything in his power to be a good conservationist and a smart farmer. He must study the weather. For real good farming there should be some fallowing, which means that a leguminous or grass crop is grown which is not taken off the land. It is cut several times during the year and the cuttings permitted to lie as a mulch. Such practice has been shown to increase yields. On such a fallowed piece of land sheet composting can be practiced, which means that manure and other residue green matter such as ground-up corncobs, leaves, etc. should be applied thinly over this growing crop to form a thin sheet layer of compost which is later plowed under. It might appear on the surface that this would be a costly procedure, for the farmer would be deprived of a paying crop for the land that is being fallowed. But actually in his cash account there will be more money after the first year of practicing the method.

Another practice which should be common to both methods is subsoiling wherever hardpans are suspected of existing or on heavy soils. Practically every implement company makes a subsoiling tool which attaches to a tractor and which will loosen the soil down to about sixteen inches below the surface without upsetting the top of the soil as a plow does. Subsoiling itself is a practice which will increase yields. If any farmer who fears to engage in the practice of the organic method will start it and at the same time begin to subsoil each acre before he seeds it, chances are it will be an insurance that will prevent his yields from declining at the beginning. This is not merely wishful thinking. Subsoiling is a practice whose worth should be shouted from the housetops.

There was a case where a farmer began to subsoil a piece of land and the subsoiling tool broke when the work was only partially completed. That part of the land that had been subsoiled gave an increased yield over the section that could not be subsoiled. The cost of the tool is less than a hundred dollars and will pay off in handsome dividends on many soils.

### Review

Now what is the organic method? I will list it item by item:

1. The organic farmer does not use chemical fertilizers – superphosphate, ammonium sulphate, cyanamide, nitrate of soda, muriate of potash and the usual numbered preparations.

2. In the place of chemicals organic matter and ground-up rocks are used – phosphate and potash rock, limestone, dolomite and many others which as yet have not been employed for this purpose and of which there are tremendous resources in this country.

3. No poison sprays are used, or they are used in greatly reduced amounts. By using large amounts of organic matter and increasing the humus content of the soil the health of the plant is increased so that disease declines greatly.

4. In the practice of the organic method the accent is heavily on organic matter. Every farmer should have some source of it, including animal manure. Single crop growers should find some neighborhood source of organic matter, like corncobs, wayside weeds and leaves. Otherwise they should put in cattle of some kind for their manure. Besides these green manure crops, this organic matter should be mulched

over growing grass crops which will later be plowed down.

That is, briefly, what the organic method is.

Now let us get to the question of whether the organic method is more expensive than the chemical one. How did the organic idea originate in the first place? Well, in the old days of the organic method, that is, between 1942 and 1949, the making of compost was a prominent part of the method. Piles of manure mixed with weeds, leaves and other residue plant matter were left to weather and to form compost which was applied to the land. Last year we discovered that not only did it require less labor to apply the organic matter direct to the land without composting, but that more of its nutritional elements were preserved by handling it in that manner. So today organic farmers are making very little compost in heaps. However, even with the laborious process of composting the organic method is cheaper. Ralph Borsodi of The School for Living at Suffern, N. Y. in 1944 reproduced in *Organic Gardening* a comparative set of costs that is enlightening.

The cost of commercial fertilizers (450 pounds 20 per cent superphosphate, 250 pounds sulphate of ammonia, 300 pounds 3-12-6 fertilizer, one ton agricultural limestone), plus 14 tons of manure and hauling charges, based on average New York state prices at the time, was $45.27; while the cost of 20 tons of manure and plant compost plus one-half ton of agricultural limestone and hauling charges was only $17.25. The cost of applying the commercial fertilizers and manure was $8.22, while the cost of spreading the manure and compost was $8.37, making the total cost, exclusive of labor, $53.49 for using commercial fertilizers with manure, as compared with $25.62 for using compost with manure. The labor costs for applying the commercial fertilizer and manure (including a charge of $5.40 for the value of potential compost materials destroyed) was $10.90, while the cost of spreading the manure/compost (including a charge of $12.00 for labor preparing the compost) was $18.30. Thus the total monetary cost of using commercial fertilizer was $64.39 as compared to $43.92 for the compost method, a difference of $20.47. The figures given are for heap composting.

In the application of the *new* organic method it is obvious that it could not be more expensive than the chemical method, for the labor factor has been reduced considerably. But our critics continue to say that our method is prohibitive in cost. When they are baffled and cannot answer our general arguments they make use of this old red-herring and say that it is more expensive. The phosphate and potash rocks that we use are cheaper than the chemical fertilizers which they replace. They even come in bags like the chemicals so that in the change-over the chemical farmer will have a feeling of security as he looks upon his great big piles of bags. The question is, will the use of the ground-up rock fertilizers give a farmer equal yields?

The Connecticut experiment station has found that rock fertilizer, in the form of granite dust, can supply potash just as effectively to tobacco as chemicals. Yields were just as high with the rock powder and quality was higher.

And the experience of the farmers of Illinois is evidence of the economy of phosphate rock. They use many times as much phosphate rock as they do superphosphate, and even their usage of mixed chemical fertilizers is comparatively low.

So it is seen that the rock products can hold their own with their equivalent in chemical form, and so far we are ahead financially because the former are cheaper than the latter.

Even though comparison shows the advantage in favor of the rock products we must remember also that the rock will come down in price gradually as its consumption increases. The present quantity of it used is not great compared to the amount of chemical fertilizers that are used. When tonnage purchased soars, its price will decline drastically, but the total profit of the sellers will be much greater than their profit today because of larger volume.

Now, in the organic method, an attempt should be made to obtain organic matter that originates outside of the farm. It is amazing what a variety of such residue products are available Take the case of spent hops from a brewery. They have been shown to be extremely valuable. The Arnold Arboretum in Boston has used them effectively for mulches under fruit trees. Corncobs have been shown to contain two-thirds the amount of nutrients contained in the corn kernels. There are mill screenings, leaves from the streets of municipalities and from nearby woods, roadside weed cleanings, cannery wastes, sludge from sewage plants, garbage from municipalities which should be covered with soil and allowed to weather, and hundreds of other kinds of organic waste. It might pay the farmer to purchase a used dump truck and to operate it, especially in the fall and the winter when farm work is at a low ebb. The cost of the labor and gasoline will be far less than the value of the organic materials obtained. As a typical example, last autumn our two men hauled 100 tons of leaves in about the equivalent of one week's time for both of them. It actually took them two week's of part time. Such leaves ought to easily be worth ten dollars a ton to any farmer if used as mulch. Which means that for the use of a truck and a total of about 100 man-hours of labor we obtained a thousand dollars worth of fertilizer. Is that bad? We expect to do this every year and strew the leaves on different fields in a process of rotation. In figuring the cost of the time of the men, actually I consider that it cost me nothing because it was at a time

of year when there was no other pressing work.

The farmer should consider that much of the costs incurred in the operation of the organic method are self-employment costs. Even though when they are considered as part of the cost of farming and still show a saving over the chemical method, much of it is incurred by the owners themselves and in salvaged time that might otherwise go to waste. Now part of this cost of going out after organic matter can be offset by the saving in rock fertilizers over chemical fertilizers, possibly all of it. But if there is a small amount that is not absorbed in that manner then it results in actual cash savings later in the following manner. After a few years of steady application of organic matter, the soil becomes easier to cultivate.

Here is an example of how advantage can be taken of the off-season in farming. In applying fertilizers under fruit trees we use what we call the ring-method. This is a mulch that is applied under the tree about two feet high consisting mostly of waste organic matter as well as phosphate and potash rock and lime. The mulch starts about two feet from the trunk and should extend out about two feet beyond the dripline of the trees. Every fall when the organic matter is being gathered the truck should go right into the orchard with it and add a few inches of material to the existing mulches. As about two inches of it decays at the bottom every year this would make a convenient annual replacement so that the ring-mulch perpetuates itself. Between the trees the mulch is applied only a few inches deep so that as you look at the orchard you see a series of rings that stand out under the trees. In other words the entire orchard is mulched but that part under each tree is higher.

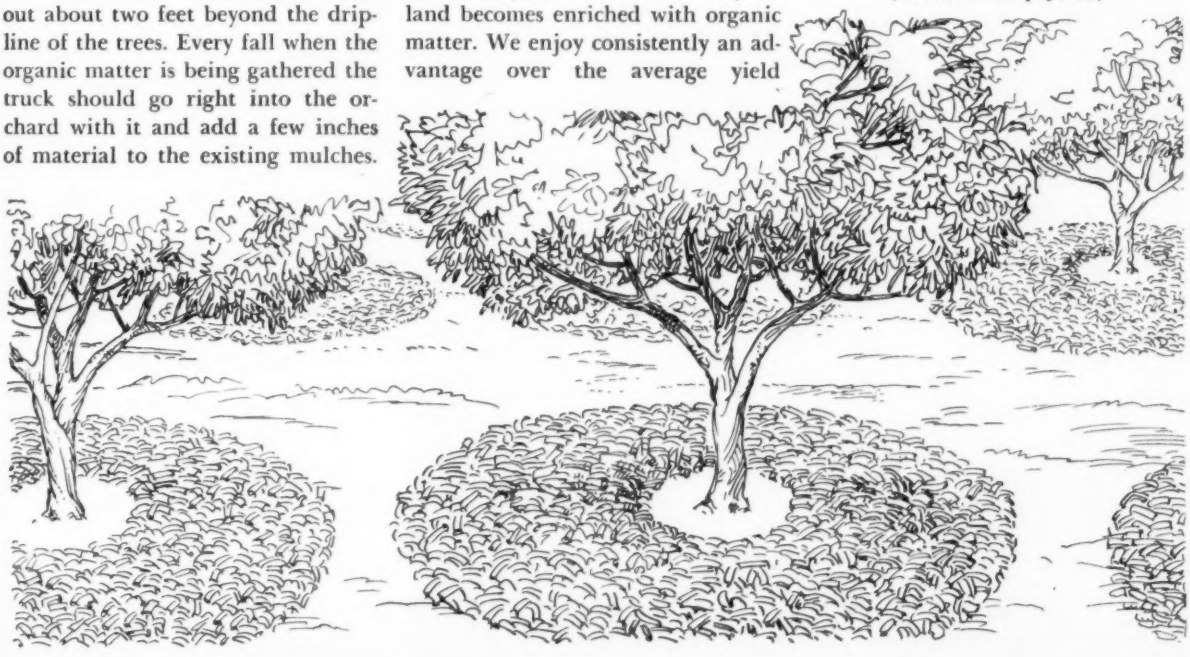
There are other hidden savings in cash which are enjoyed later that must be included in this consideration of comparative costs. In a year of drought a soil that is full of organic matter will pay for itself many times over. In such years I have made a check in our area of the corn crops and where the crop was standing up I found that the farmer had a good supply of manure. Where the crop was a failure I discovered that that farmer depended mostly on chemical fertilizers. It is amazing how well it showed up. In such a drastic drought year our corn stood up beautifully. An item like this must be considered in the profit and loss picture.

The greatest factor in the consideration of this question is the increase of yields that come as your land becomes enriched with organic matter. We enjoy consistently an advantage over the average yield figures in our section of over 40 per cent, based on figures that we obtain from the State, whereas the farmer from whom we purchased our farm 10 years ago obtained yields way below the average. The same story is told by hundreds of practicing organic farmers. It is not a generally known fact, but the effect of having a good supply of organic matter is a terrific factor in obtaining good yields. Such organic matter acts to make the nutrients in the various rock fertilizers more active. The various agricultural stations do not fully realize this for they have never experimented extensively with farming by the organic method. If the truth were known and publicized properly the use of chemical fertilizers would quickly become a thing of the past.

We must consider also the fact that the quality of crops raised by the organic method is higher. They contain more vitamins and today in many channels organically produced crops are obtaining premiums. A smart farmer can arrange to grow crops that he can sell to an appreciative market at premiums.

One of the reasons why higher yields are obtained as well as higher

(*Continued on page* 58)



**The ring method of mulching keeps a large amount of continually decaying organic matter under orchard trees at all times.**

# Paul Keene of Penn's Creek

## For this man, the organic approach is the only rational one.

By ALDEN STAHR

*Photos By the Author*

"FOR us, the concept of farming as a way of life is basically sound, and the organic approach to farming is the only rational approach." This statement and others made by Paul Keene made sense to us. In fact, we were so impressed by the logic of his attitude toward food production and his friendliness that we went to see him. The Keene's farm, was a bright spot even in its section of fine farms. Although we had never seen the Keenes before, it was like a reunion among old friends, for there is a sure fellowship among folks who raise food the way God intended.

In our first kitchen confab, at chore time and walking about the fields, we tried to learn as much as we could about this unusual organic farm. And later we made two more trips to Penn's Creek to keep abreast of developments.

Keene is confronted with the problem common to many farmers either starting organic farming fresh or switching from chemical agriculture. He works his two hundred acres alone, has no ready-made outside source of organic material; and does not have enough animals to produce manure in sufficient quantities to spread on the whole farm. If he had a little extra money he could buy manure or hire a man to go around collecting organic wastes. He hasn't and can't. Yet, with these limitations, Keene runs his farm on an organic basis.

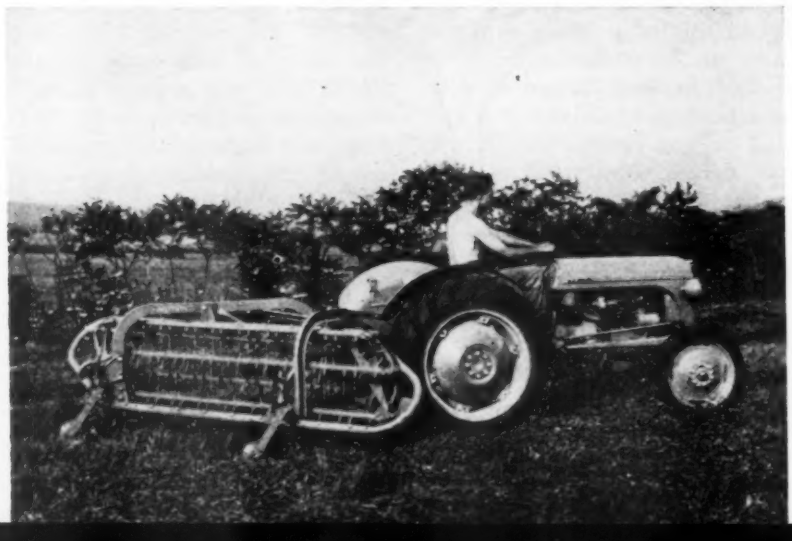
How does he do it?

For one thing, the farm he bought five years ago had been in the same family for over a hundred years and until recently maintained a large dairy herd with careful management of manure and with little if any commercial fertilizers used. Then Keene planted and plowed under buckwheat, rye and vetch, soybeans, and a crop of cowhorn turnips, which decompose on the surface for humus and can be harrowed in without plowing. These manure crops were followed by oats planted together with pasture seed, chicory and clover and now, on extremely stony soil, Keene has lush pasture without using a grain of commercial fertilizer.

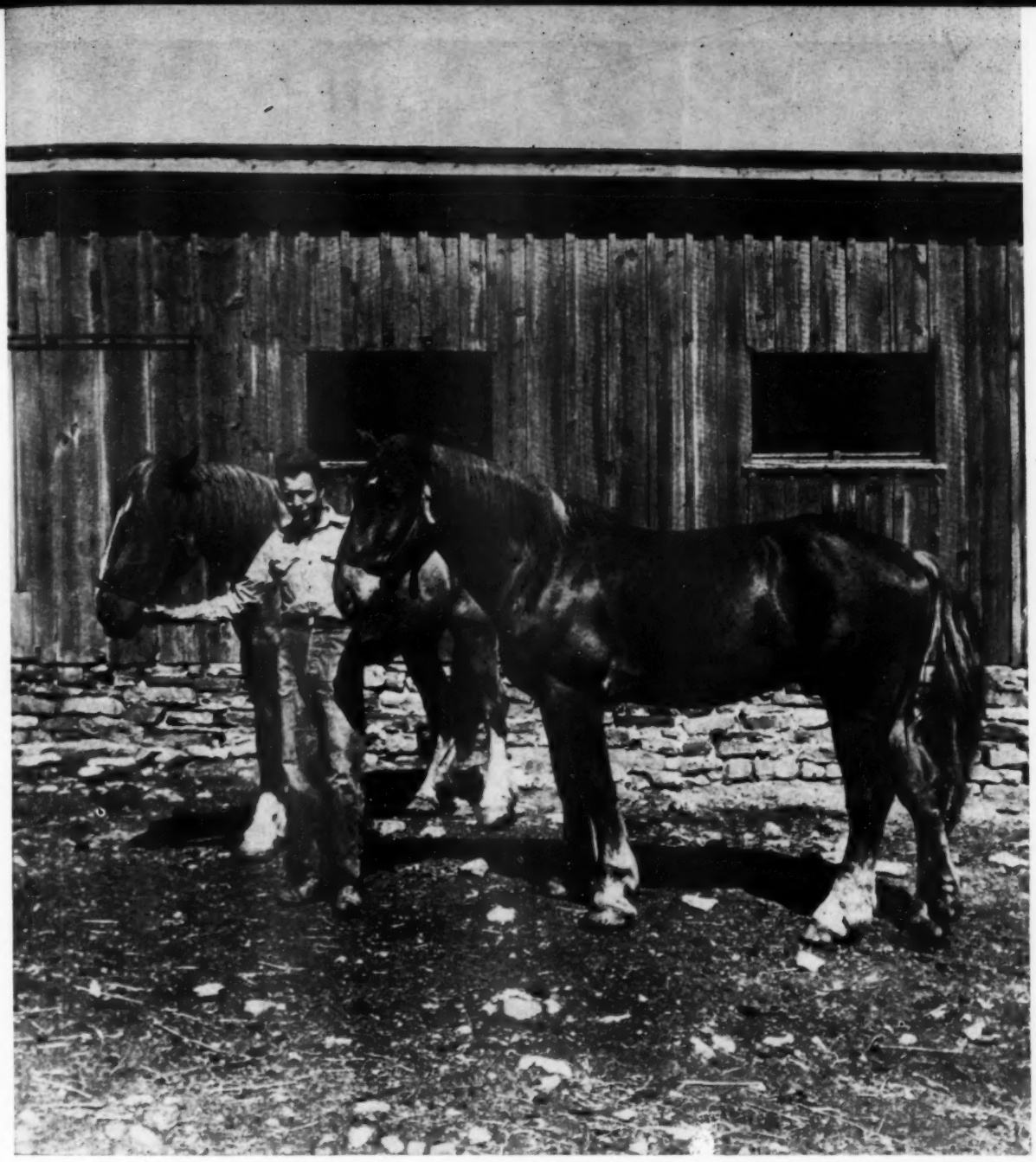
**Betty Keene weighing up organic flour for shipment to a customer.**

### Barn Composting

The manure from cows, horses and sheep is allowed to pile deep in the barn where it is mixed with straw, and trampled and soaked with urine by the animals. In effect, this is a big compost heap and when mostly de-



**The horses were sold in favor of this Ferguson tractor, shown with the revolutionary Ferguson side-delivery rake, Paul Keene up.**



**Paul Keene thinks horses are better company than a tractor, but he found them impractical on a one-man 200-acre farm.**

composed, it is spread on grain and corn fields in the rotation after plowing, and disked in. Keene raises millet, wheat, soybeans, rye, buckwheat, corn and sunflower seed and sells his organic, stone-ground flours to some of the many people looking for higher quality, better tasting food.

Keene felt that raising grains organically was a bit more difficult at first, but it is having its rewards. Besides leading to a thriving business it has led to recognition through a write-up by Clementine Paddleford in the New York *Herald-Tribune*, and another by the magazine, *Gourmet*. In addition to the organic flours, the Keenes sell organic jam, cookies, honey and even broilers which have been shipped by mail as far as Chicago.

They try to concentrate on products which may be shipped easily and which will bring them the full retail price. They can earn more by producing quality products on a smaller acreage than would be re-

**Four organic farm families in front of the Keene's house, making short work of a hundred ears of organic sweet corn. Present are the Keenes, Parkers, Stewarts and Stahrs.**

# Paul Keene of Penn's Creek

*Continued*

quired for commercial production at wholesale prices. Now in its fifth year, Walnut Acres is making a good living for the Keenes, and our visit proved to us that organic farming is better living indeed.

### Early Experience

Organiculture and the Keenes were not strangers when they bought Walnut Acres. Paul had long been interested in the subject, had managed farms and had taught homesteading at the "School of Living" at Suffern, New York and worked at Kimberton Farms Agricultural School near Philadelphia. And Betty Keene's mother practiced organic gardening in India when Sir Albert Howard first launched modern organiculture there. In fact, Paul and Betty met and were married in India, so their knowledge of organic farming springs right from the fountainhead of the present-day organic movement.

The Keenes feel that, having learned the truth about farming, it is their responsibility to help others to find the truth, too. Mail-order customers for flour and other products write long and searching letters by the hundred, asking questions about foods and organic farming, and uncounted carloads of visitors arrive at the Keene farm from many states. One time when we were there, a carload was just pulling out on our arrival and another carload was due the day after we left. Some families have stayed as long as a year, learning and practicing organic farming, but such long stays are no longer possible as the "spare house" on the place has been sold to another organic farmer, Stan Parker.

To promote the organic farming movement still further the Keenes bought two adjoining farms and sold them to organic farmer-friends, the Stanley Parkers and James Stewarts. Parker had been working his farm about a year when we were there in 1950 and Stewart is just starting. Each of the three farmers tries to have different pieces of equipment for two Ferguson tractors and they co-operate in haying, etc.

Keene speaks on farming to clubs and groups in nearby towns and recently was invited to speak on organic farming to an audience composed of teachers of agriculture. A friend later told Paul that the group had come prepared to pick him to pieces, but he gave them so much to think about that not a dissenting word was heard at the end of the talk.

### Details of the Work

A number of factors caused Paul to change his mind about farming with horses, which he loves, and buy a tractor. On a one-man farm, he found it virtually impossible to work any sizeable acreage with a team without killing himself and the horses. And one day while we were there, Bob, one of the horses, had his flank badly torn by his team-mate in

a not-too-playful kick — meaning a veterinary bill and a horse laid up indefinitely. And there has been many a time when Paul could have kept on plowing but the horses had to be rested, with resulting loss of time. On old-time farms with big families and several hired men it was possible to keep as many as a half-dozen teams plowing or doing other work in the same field, and the work got done as fast as a tractor could, but these conditions no longer seem to exist. (Paul has three young daughters and no hired man.)

Paul finally succumbed and bought a tractor, and with it plowed and harrowed thirty acres this fall in a fraction of the time it took him by two-horse-power. He thinks though that, as a companion, a tractor is no match for a horse.

Keene uses a binder in harvesting his grain and hauls the shocks to the barn to cure for a few weeks before threshing. He is fortunate in having one of those vast barns which seems to have room for everything. The shocks of wheat fill one huge compartment; the next one provides shelter and working space for the big thresher when it arrives; and the next room catches the straw and chaff as it blows from the thresher. Additional compartments store the year's supply of hay and still allow room to drive in with a hayload, drop the big fork into it and dump it on either side.

As to threshing versus combining, Paul follows the local custom, for the farmers in this area believe that binding, storing and threshing yield better grain. The grain is allowed to mature on the stem, continuing to draw sustenance for a time, and dries more thoroughly. Threshed wheat seldom if ever has trouble with heating as does combined wheat, and is somewhat higher in nutritional value.

On one occasion Keene had to combine, however. The Hubam clover he had planted in the wheat as a follow crop had grown higher than the grain, so binding would have been impracticable.

Rat-proof bins on the second floor of the bank barn provide storage space for Keene's wheat, oats, rye, buckwheat and soybeans. The flint corn for corn meal is, of course, stored in the corncrib. Paul says he was so busy one year that he amazed his neighbors by not husking his corn until Decoration Day at the end of May. However, to anyone who has husked corn on a bitter November day, a warm day in May seems fine for that job.

Paul Keene had an enlightening experience with organic wheat versus chemical-grown wheat. Orders for flour had been too numerous and he was running low on his own wheat. Since he could not spare any for the chickens, he bought a few bushels of wheat from a neighbor to make scratch. The neighbor's wheat was full of weevils, but even when it was stored next to Keene's wheat, which was easily accessible to the bugs, they did not attack the organically-grown grain. Such remarkable resistance is not an isolated case, for we had the same experience right here last summer. We had bought a sample bushel of wheat which was reportedly grown organically, but we found out later that commercial fertilizer had been used. This bushel must have included over a thousand weevils, for we spent hours blowing them out of it with a fan. Subsequently, we bought several bushels of wheat from a farmer who had manured and limed his field but had not used fertilizer on it for the past fifteen years. There were no weevils in it even before it was put through the cleaner. Explain this phenomenon, if you can, on any other basis than the superiority of naturally-grown over artificially-grown food. I'm aware that moisture content is a factor in weevil control, but both of these batches of wheat were grown and stored in the humid conditions of the east.

Before he grinds his flour, Keene clears the wheat of chaff and dust with a seed cleaner, such as may be bought from a mail order house or farm equipment dealer. He grinds flour fresh to order and mails it the same day as milled. He has a Meadows grist mill with twelve-inch stones, which grinds three to four bushels of grain per hour and is powered by a three horsepower electric motor.

At first he used paper bags as shipping containers, but later he shifted to cloth because of its greater strength.

### Some Difficulties

As to cultural practices, Paul is frank to say that, like almost all farmers, he has had his difficulties. He has conscientiously tried to operate on a purely vegetative basis, plus a thin spreading of partially-decomposed manures.

**Walnut Acres, the Keene's organic farm at Penn's Creek, Pa. Chicory and clover pasture in the foreground.**

# Paul Keene of Penn's Creek

*Continued*

As Keene says: "Going on Edward Faulkner's hypothesis, I built up my pasture fields over two or three years by not taking off any crops and by plowing under huge crops of green matter. Green manuring was calculated to supply all the minerals that could possibly be needed, and in their proper proportion. I am on a limestone soil, incidentally.

"This year I pastured my sheep exclusively on these two new pastures, alternating every few weeks. Yet several weeks ago I noticed more and more of my sheep growing stiff and lame. I thought it was foot rot and treated some of them for that but to no avail. So finally I called the vet. Believe it or not, my whole flock had rickets. Explain that! Now with good old-fashioned bone meal I am bringing them around . . .

"I can see good results on the farm, of course. My wheat gets manure, lime and phosphate rock, and that makes a great difference. I know it would be still better if I could add other minerals in organic form in small amounts — potash, for example. I expect to do so . . . "

Keene's experience with mineral lack is illuminating and should be helpful to other organic farmers. Even though his farm sits on a layer of limestone his sheep suffered from lack of calcium. It seems obvious that you can't farm a place for a hundred years or more without taking away some of the mineral content of the soil, especially the readily available minerals. Fortunately it is now possible to restore the minerals with purely natural materials. Phosphate rock contains in addition to phosphorus, about a dozen trace elements; limestone supplies calcium, magnesium and several trace elements; and greensand and granite dust furnish potash plus forty to fifty trace elements. As Keene mentioned, he had good results when he applied stone dusts to his wheat field — plus manure and vegetable matter.

### Individual Experimenter

Keene has experimented extensively with different kinds of cover and pasture crops, planting the cowhorn turnips used by old-time organic farmer Bob Seeds and sending to England for chicory and other plants to include in pastures. Chicory, incidentally, was relished by the cows and sheep when it was young, but when it matured they found it less palatable, which is true of most pasture plants.

"Regarding my livestock feeding program," says Keene, "I have become extremely unscientific. I remind myself of the old housewife – a pinch of this, a little of that. Take chickens, for example, bearing in mind, of course, that I get very few eggs in winter. They get a mixture of equal parts by measure of corn, oats and wheat in the form of scratch grain (no mash), twenty-five pounds per hundred birds per day. In addition they get all the skim milk they can drink, or that we have. If I did what I know to be right, I would have succulent food for them every day — cabbages, beets, carrots, greens or sprouted oats or soybeans. I used to sprout oats for all my stock, with excellent results.

"Cows? Depends on what I have. Depends on the quality and quantity of hay. Depends on the location in their lactation period. I grind up equal parts by measure of oats and corn and then add equal parts of my soybeans, ground, if I have them. A little bran and millhouse cleanings, a little salt, ground limestone and bone meal. If I have no soybeans, then I put in linseed meal, perhaps not quite as much. Or some linseed meal and some alfalfa leaf meal. Or purchased soybean oil meal. See what I mean? It's as hard as the dickens to give a formula. I use Morrison's book *Feeds and Feeding* as a

**Some of the sheep at Walnut Acres, which provide a good means of turning organic pasture into good organic meat.**

general guide and fill in with what I have."

I might add that Paul uses all organically-grown feed except for minor items like linseed meal, and he grinds feed fresh as used. The importance of frequent grinding cannot be overestimated, for it is commonly known that grains begin to lose their nutritive value soon after they are ground. Flour for human consumption acts the same way.

When animals are fed on commercial feeds, they are getting substandard grain raised with chemical fertilizers and when this grain is milled a month or so before use, it loses a good part of what little nutritive value it had to start with. Substandard nourishment, in animals and human beings alike, leads to lowered resistance to disease.

### Part of Rural Living

Paul Keene thinks of organic farming as the only right mode of agriculture, but considers it only part of the larger issue of rural community living. He, in common with many other thinking people, thinks of cities and city dwelling as diseases of society and that the basic self-sufficiency made possible by living on a farm is a needed and rational underwriting of the future well-being of America. Keene has delved deeply into the numerous movements fostering rural community living in the United States and even went to live in Ghandi's school of rural living in India, and talked long with Nehru about this subject.

In fact, when Nehru was in New York, Keene was invited to attend the dinner in the Indian's honor at the Waldorf-Astoria and felt quite overwhelmed that he, an organic farmer, should be in the company of such United Nations dignitaries as Trygve Lie, Eisenhower and others. But while he was in the rushing, crowded city he was yearning for the country, where he returned a few hours later to peace and better food.

Even the finest hotel in the world cannot offer a meal which is wholly nutritious and which has been grown without the use of artificial chemical fertilizers and poison sprays!

# A Straw Worth Grabbing

SYNTHETIC substitutes for broomstraw have been on the market a long time, but none has ever succeed in sweeping out of favor the old-fashioned brush of broomcorn.

Some 45 million brooms are made of the natural straw every year in America, and many farmers in regions favorable to its growth have found broomcorn a highly profitable crop. Even back in the frugal days before vacuum cleaners, broomstraw prices ranged from a normal $100 to $250 a ton. Last year farmers were getting between $250 and $350 a ton. This year broomstraw prices soared to a record high, with growers being paid from $400 to $475 in the field.

These peak prices may be accounted for, to be sure, by unfavorable growing weather which cut the crop to little more than half its usual size, and heavy government buying for the armed forces. The 1950 crop was reported as 37 per cent smaller than that of 1949, and is the smallest on record. And the military establishment, which bought some 30 per cent of all brooms manufactured during the second World War, was expected to commandeer as much as half of this year's broomcorn harvest.

Extraordinary market fluctuations notwithstanding, broomcorn has proved itself a steady money crop over the years to growers in Oklahoma, Colorado, New Mexico, Texas, Kansas, and Illinois. These six states produce nearly all the broomcorn raised in America. As a specialty crop, nevertheless, it should be worth investigating by farmers in other regions suitable to its growth. Broom manufacture still is mainly a decentralized industry, with hundreds of small broom factories scattered across the country providing ready local outlets for the product. And the fact that broomcorn yields are often doubled by special care on individual fields should make the crop all the more appealing to organic farmers.

Broomcorn, a nonsaccharine member of the sorghum or cane family, is not a native American plant. There is a story, which may not be true, that it was introduced to this country by Benjamin Franklin. One of his European friends sent him a small whiskbroom as a present. The ever-inquisitive Franklin noticed three tiny seeds clinging to the straws, and he planted these in his garden. Only one of these exotic seeds grew, but Poor Richard was so delighted by its strange appearance, a tall slender stalk crowned with a bristly inflorescence, that he gathered the seeds and made presents of them to his neighbors. Broomcorn is grown as an ornamental plant to this day, and the *decor* of a Victorian parlor was never quite complete without a gilded brush of broomstraw in a big handpainted urn. But the utilitarian possibilities were soon appreciated. It was grown commercially in this country as early as 1797.

Broomcorn will grow wherever corn will grow, but it does best in a fairly warm climate. Light, sandy soils produce the highest quality dwarf type, and richer, heavier soils are preferred for the standard variety. But inasmuch as broomcorn is a subtropical plant, climate is even more important than soil for its growth. Also, if the crop is to be harvested at the proper time and in good condition, and the brush dried rapidly to keep its fresh green color, warm dry weather is needed at harvest time.

Although several strains have

(*Continued on page* 51)

# Some Facts About Hybrid Corn

## In defense of the century's most ballyhooed agricultural innovation.

**By H. J. SNIDER**
*Illinois Experiment Station*

ONE of the outstanding facts about hybrid corn is its rather universal acceptance by the careful, conservative corn-belt farmer. The corn-belt makes up less than eight per cent of the land area of the U. S., but this fertile strip of land produces about two-thirds of the corn grown in this country.

Nearly 100 per cent of the corn grown in the corn-belt is of hybrid varieties. Such general acceptance would be hard to achieve in this vital food producing area if there was any great deficiency in the quality of the product. There is no desire to single out the corn-belt farmer as a leader in the production of hybrid corn. There are regions entirely outside corn-belt states which have adopted hybrids nearly 100 per cent and are making very effective use of them in their farm programs. There are other areas which have accepted it less than 50 per cent, but these are merely waiting until the corn breeders have had time to develop varie-

ties which meet all the requirements of their particular regions.

In a recent article in *The Organic Farmer,* Ernest M. Halbleib condemned hybrid corn from many angles. One of Mr. Halbleib's strong arguments against hybrid corn was its "inferior product" compared to that of open pollinated varieties.

Protein content is about the strongest indication of quality in corn. The Illinois Experiment Station has found that hybrids are equal to and frequently superior to open pollinated varieties in protein content. (Ill. Agr. Circular 1340.) In a test covering five years, open pollinated Krug averaged 9.3 per cent protein and hybrid U. S. No. 5 averaged 9.8 per cent protein. In another test open pollinated Henry Moore averaged 9.9 per cent protein and hybrid U. S. No. 200 averaged 10.4 per cent protein. There is other similar evidence which indicates that the protein content of open pollinated corn is not always superior to hybrids.

*EDITOR'S NOTE: Last June we published a well-thought-out support of open pollinated corn by Ernest M. Halbleib. That article aroused much comment, both from those who were not impressed by Mr. Halbleib's case against hybrid corn and from farmers who liked his argument. Now, we are giving a friend of hybrid corn, H. J. Snider of the Illinois Experiment Station a chance to present his case. Mr. Snider has done a good job, but we still feel that open pollinated corn is the organic farmer's best bet. Long experience with hybrids has shown that they do lack trace elements and are often low in protein.*

When the protein content of corn is unusually low, a decline in the fertility of the soil, is usually the cause, mainly because of a loss of nitrogen and soil organic matter.

This point is illustrated by hybrid corn grown on the Morrow Plots in Illinois. In these field tests exhausted soil produced hybrid corn (in 1949) with only 7.8 per cent protein. The same hybrid contained 10.4 per cent protein when grown on land where the fertility was maintained by the use of organic material such as legumes, and manure along with limestone and rock phosphate.

### Hybrid Corn Makes Good Feed

As for hybrids producing inferior silage, Illinois Bulletin 494 shows that hybrid corn was superior to open pollinated in both quantity and quality of silage. The authors of this bulletin, Dr. W. B. Nevins and Dr. G. H. Dungan state further that the hybrids stood erect and held the ears much better than did the open pollinated varieties and in this respect were more desirable.

It is true that the Nebraska Station found better results with open pollinated corn when fed for six weeks to chicks. However, in this test they used open pollinated with 11.3 per cent protein and a hybrid with only 9.1 per cent protein.

The Indiana Station compared Reid's Yellow Dent with three Indiana hybrids and found no difference in gains when fed to pigs. The Ohio Station found slightly better gains with pigs in favor of open pollinated corn. None of these tests, and general farm experiences, showed any large or outstanding differences either way.

Regarding the mineral content of corn, the Illinois Station results show that there was no essential difference between hybrids and open pollinates. Mr. Halbleib mentioned cobalt as being totally lacking in hybrids. Dr. S. W. Melsted of the Illinois Station has spectographic analy-

**Pin striped fields of hybrid seed corn are becoming more and more a part of the country landscape.**

# Some Facts About Hybrid Corn

*Continued*

ses of hybrid corn, and these results show that Illinois hybrids do contain cobalt. It is true the amounts are small ranging from two parts-per-million down to less than one part-per-million. Cobalt may be found in hybrid corn, but not in large quantities. Cobalt has recently been found to be a vital element in the animal protein factor.

### Green and Ripe Ears

Apparently Mr. Halbleib had not given very close attention to the processing of hybrid seed corn, especially by the larger producers. These seedsmen have rather rigid standards of quality and do not remove corn from the field until the grain has a relatively low moisture content. The mechanical picker in the field takes off all ears regardless of size or maturity. At the processing center the corn ears pass over a conveyor belt and long lines of workers, usually women, pick over the corn and discard ears undesirable for seed. There is very little possibility of green or immature ears getting as far as the sheller.

### Remember Those Sore Hands

Mr. Halbleib should also remember that planting seed from the entire ear was never a general practice in the old open pollinated days. What farm boy of those days can't remember the sore hands gotten from shelling the tips and butts off of seed corn ears? Hybrid seedsmen want to dispose of the small grains or "rounds" as the trade calls them. This grade of seed corn is quoted at a lower price and may be guaranteed to give as good results as the "large flat," but there are few takers.

Is it more ridiculous to advocate stopping detasseling corn plants because of possible harm, than it is to stop the castration of farm animals? Final results are the same and farm livestock has steadily improved under this selective method.

### Organic Methods

Organic methods are basically sound and improve any corn, open pollinated or hybrid. It is unreasonable to assume that corn can be improved only by field selection of the seed of open pollinated varieties and plus the applying of an organic method of soil improvement. Hybrid seed corn is subjected to very rigid field selection and in addition has the utmost in scientific practice and discovery applied to it.

Hybrid seed producers have long been aware that organic methods of soil improvement give more and better seed corn. For example, a "hard-boiled" field man of a hybrid seed producer in Nebraska very vehemently declared that he would quit buying seed corn grown on a particular farm unless Mr. Jones plowed back more alfalfa and sweet clover into the soil. He asked nothing more of farmer Jones than that he follow the organic method of soil improvement. Eastern Nebraska farms are given over almost entirely to the organic method of keeping up the productivity of their land. They grow large acreages of sweet clover which is plowed under for soil improvement. They also use large acreages of alfalfa for hay, pasture and soil improvement.

These western farmers grow vast acreages of hybrid corn. Their acre yields are large and the quality of their product is high.

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### Forcing Pullets Is Not Good Management

FORCING pullets into high egg production is not good management. So says John C. Taylor, extension poultryman at Rutgers University. It always results in a serious setback in production from these pullets in the end of a three to four-month laying period, he says.

Good management of pullets will keep them coming up in production, with the result that they will lay over a longer period of time without a drop in production. Check feeding consumption, Taylor urges. Pullets coming into production are likely to eat larger amounts of mash than necessary.

Records from the New Jersey Flock Mating Test indicate that the consumption of 12 pounds of mash per 100 birds daily is satisfactory during the fall months. The ration should be increased approximately 1 pound starting the first of the year and continued for the next 3 months.

Grain consumption is the important feed item to check. New pullets should consume larger amounts of grain than mash. Records show that 13 pounds of grain per 100 birds daily during October will assure a high feed consumption of grain, with an increase of 2 pounds or a total of 15 pounds of grain during November.

Therefore grain consumption should be increased during the fall and winter months. Give new pullets all the grain they can eat.

Artificial lights in the laying house should not be used on new pullets until production has reached 50 per cent or over. Earlier lighting simply increases production to a high rate with a resulting drop later on.

Remember also the importance of keeping a continuous supply of fresh water, and also a supply of limestone grit before the birds at all times.

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### Wire Mesh Guards Trees From Damage

Home fruit growers and commercial orchard owners alike are urged to be on guard against possible mouse and rabbit damage to trees.

Ernest G. Christ, associate extension specialist in fruit growing at Rutgers University, suggests wrapping each tree with quarter-inch wire mesh 18 inches high and extending 3 or 4 inches into the ground.

Alfalfa-grass pastures form the nucleus of the Gobbo brother's 670 acre farm near Grand Junction, Colorado. The hay cuts five tons per acre each year, and gives 1,500 lambs and a minimum of 100 steers late grazing in the fall. Shown are Louie, left, and Frank, inspecting a field cut four weeks previous and ready for its second cutting.

# Colorado's Missing Link

## Cattle and sheep restore the organic matter to the soil of a Colorado farm.

By NORRIS JACKSON

TURNING a new soil with his plow, many a settler has boasted "This soil is so rich it will never wear out," and unintentionally proceeded to find out. But, unlike many of his boasting friends, V. Gobbo saw to it that his 160 acres would remain in continual production. So firmly did he believe in maintaining and increasing his soil fertility, that he instilled that belief in his five sons, Louie, Frank, Ray, Joe, and John.

"Keeping the soil in good shape is as important as keeping your body

**These lambs, shown grazing on summer range in the high altitudes of the mesa country near Grand Junction, will go on late fall pastures of alfalfa and grass on the Gobbo farm. The late grazing gives humus for earlier hay production in the spring, and provides a more leafy and better quality hay.**

## Colorado's Missing Link

*Continued*

healthy,'" the elderly Gobbo told his sons as soon as they were old enough to do chores around the farm. "You get a higher yield and more money for your better quality crop. And a healthy soil — or good fertility — will cut down disease and minor insects, which take a huge slice of the farm profit pie every year."

That was the principle upon which his sons were taught to farm. A tour of the present operation will show even the layman that the boys — all married with families of their own — still follow that guiding rule. John now operates a place of his own, while the younger four brothers continue with their father's original homestead and 510 acres of cultivated land bought during the past three decades. The farm, all under irrigation, nestles in the Colorado River valley near Grand Junction, Colorado.

The dubious visitor to the farm will see production records of corn that cuts at least 18 tons of ensilage or 80 bushels of dry corn per acre each year; oats and barley reports that show consistently 70-bushels per acre; and alfalfa production records of 5 tons of hay per acre and two months' of fall grazing every year. One test planting of corn last year produced 120 bushels of dry corn per acre — it had received an extra dose of barnyard manure and an increased planting rate, indicating the possibility that the brothers could go even further with their "good soil fertility is good soil health" principle.

Ironically, the brothers' method of

increasing their yields and maintaining a mellow organic composition in their soil is simple. Their farm economy includes livestock, which provides sufficient quantities of barnyard manure for their crop lands every year; it emphasizes the use of home grown hay, silage and grain to feed their cattle and sheep; and it gives equal importance to managed crop rotations with a green manure crop so that the soil will not be mined of its fertility.

The brothers insist — even though the valley will hold its own in comparison with other small livestock producing areas — that farm operators in the valley would be better off if they made room for more cattle and sheep on their farms. Or they could contract for livestock to utilize their late hay crops. They could even take advantage of manure from the state's feed lots, making money on long hauls to bring the manure to the farms.

"Our experience has been that our insect and weed control programs are reduced by at least one-third because we graze our alfalfa-grass pastures in late fall and by spreading liberal quantities of barnyard manure every year. The same livestock that graze our pastures give us the manure we need to spread over our croplands to keep the organic matter content high."

Each year the Gobbos maintain a band of 1,000 ewes for lambs to utilize their fall pastures and for winter feeding. About 150 cows form the nucleus of their cattle program, giving them 110 to 125 steers and heifers for winter feeding. All of the livestock is wintered on the home pastures and winter ranges, while spring and summer ranges are located on 10,000 acres of privately-owned land in the high altitudes of the nearby mesa country.

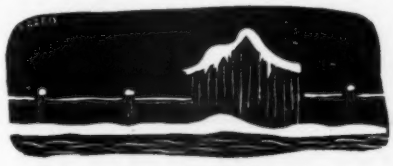
With over 200 acres in legume-grass pastures every year, the Gobbo's turn in 1,000 to 1,500 lambs to glean the fields after the third cutting of hay in late September. Moving the sheep about November 1, the boys clip the pastures so that all plants will start growth evenly in the spring.

Late grazing in the fall, coupled with the natural manure give the brothers a cutting of hay 10 days earlier in the spring than their neighbors. They say the reason is more humus from sheep and cattle droppings in the fall and the resulting decrease of insects in the spring, because of a more healthy crop. Too, the close fall grazing makes for a more leafy hay. "If we wanted to feed wood, we'd go to the river and cut a load," they seriously point out. Three cuttings bring a harvest total of 5 tons per acre per year.

Their pasture mixture is 4 pounds each of brome and orchard grasses and 8 pounds of alfalfa per acre. The grasses offer a variety of forage for the sheep, which especially like the brome in early spring before they go to late spring and summer ranges. The true grasses also eliminate much trouble of bloat in sheep and cattle by balancing the protein-cellulose content of the 14 per cent protein alfalfa.

The cultivated land receives 20 tons of barnyard manure per acre every year — an extremely generous amount — insuring adequate return of organic matter to the soil to keep it mellow and easy to cultivate. Their cropping system gives four years of alfalfa-grass, three years of corn, one year of small grains, and a year of beans. Corn follows alfalfa-grass, which is turned under in the spring as green manure after it serves its four-year pasture purpose.

After the manure is spread in the spring, the corn ground is worked down, plowed and leveled for even distribution of water and to insure moisture beneath the seed. After irrigation when the soil is sufficiently dry to permit entrance of tractors, they build a ridge for planting. The seed is dropped in 30-inch rows at a rate of six pounds per acre.



"All of the corn is kept on the farm to finish off our lambs and steers and to give winter feed for the breeding herds. About 25 acres of corn are cut for ensilage while the rest is harvested as dry corn. A hundred steers put on two pounds a day on a ration of corn ensilage, some cob meal, and barley, from November to April. Nearly 1,500 lambs put on 16 to 20 pounds each between November and January 1 when they average 104 pounds after trucking to a Denver market."

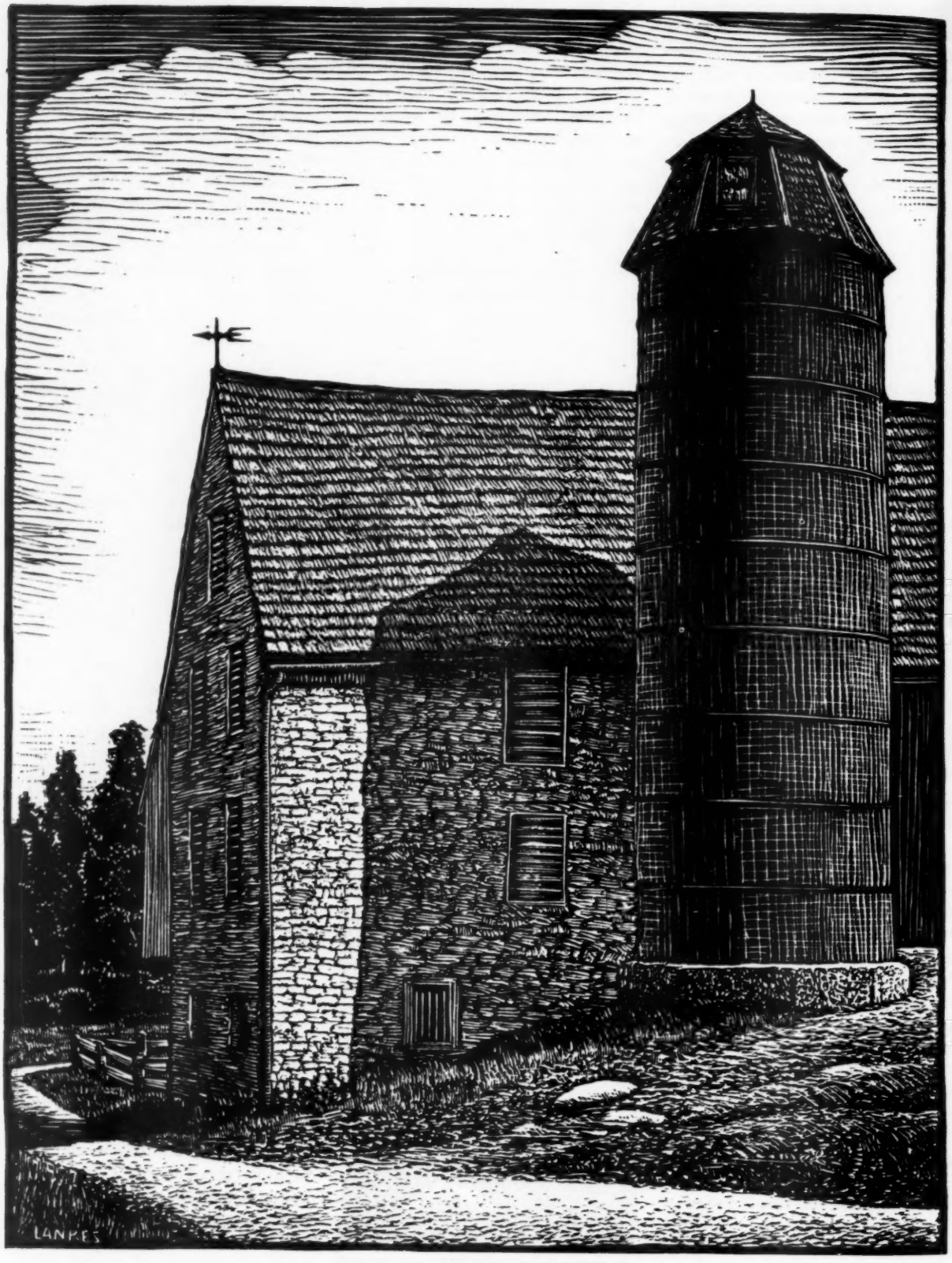
A 55-acre apple orchard receives as much attention and good management as do the crops and livestock on the Gobbo farm. Formerly a mainstay of the valley, apples gave way several years ago to peaches. However, the Gobbos believe the delicious apples are on their way back.

Forty acres of the orchard were planted four years ago to Double Red and Rome Beauty Delicious varieties, while the remaining 15 acres were planted two years ago. The older orchard will bear some fruit next year.

Pruning their trees to get a good shape and to get a larger harvest of better fruit later, the brothers have over 900 trees on the 55-acre tract. The trees are planted in 25-foot rows at spacings of 35 feet in the row, giving a space of 50 feet between trees. "It just about insures air circulation and sunlight."

This spring, a seed drill was kept busy for nearly a week, seeding red clover as a cover crop under most of the trees. That land, too, received a liberal application of barnyard manure before seeding.

"The neighbors tell us we use more barnyard manure in a week than most of them do in a year," the brothers comment. "But we tell them to look at our crop yields, feel the texture of our soils, do the same on their places and see if they can't tell the difference. For many of them, a light touch of our soils tells the story. They know the feel of their limp, sick lands. And they know instantly why their yields are sick, too."




A woodcut of a Pennsylvania barn and silo by J. J. Lankes.

*The second article in our series summarizing farm techniques.*

# SILAGE

## Once bitterly fought in America, the silo method of preserving forage crops has many advantages.

FORTY years ago silos were as strange as motor cars on the American rural scene. The first silo above ground in America had been built by a Michigan farmer in 1875. It was a square structure inside his barn. Sixteen years later the Wisconsin Experiment Station published plans for a round, tower-like silo, similar to those in modern use. But even this more efficient type was regarded with such extreme wariness that it was not until about 1910 that silos began to gain popularity. Although there were fewer than a hundred in the whole country as late as 1882, it is estimated that at present American farms have nearly a million permanent tower silos.

The process of preserving green fodder by storing it in an airtight chamber is, nevertheless, an ancient farming technique. The very word *silo,* which we got from the Spanish, may be traced back through Latin to a word the Greeks had for a pit to hold grain. The Romans used big casks for silos.

Although the principle of conserving quantities of forage that might otherwise be lost remains the same, a vast amount of modern research has gone into tests of silo efficiency, methods of ensilaging crops, and comparisons of plants adaptable for silage. These experiments are still going on, and scads of reports on silos are published every year. Curiously, little work has been done toward determining the possible effects chemical fertilizers and poison spray residues may have on the nutritive value of silage – to say nothing of their ultimate effects on human beings who eat the meat and drink the milk from animals fed that silage.

### Silos Viewed with Alarm

Advantages of the silage process so clearly outweigh its few disadvantages, it seems a wonder that American farmers were slow in accepting it. Abundance of dry feed and costly, sometimes fatal blunders do not altogether account for this early reluctance. Often silos were met not only with suspicion, but outright hostility. Advocates of silage feeding were denounced as dangerous crackpots. Heated editorial campaigns back in the gaslight era sounded the alarm that although feeding silage enormously increased milk production (a fallacy), it spoiled the taste and food value of milk (which can be true).

Perhaps the greatest advantage silage affords is that of utilizing the whole crop as feed. Corn, for example, loses 30 to 40 per cent of its food value when husks and fodder are left in the field. But properly ensilaged corn, stalks and all, keeps about 92 per cent of its food value. Thus the silo conserves larger quantities of forage than any other method.

### Silage Feeding Advantages

Silage is highly palatable and is less wasteful in feeding than any other preserved forage. Poor hay crops, filled with weeds, still make passably good silage, and many weed seeds are killed by the process. It is the most practical means of supplying succulent feed, which is especially important to milk production when cows do not have free access to water. More nutrients are retained by silage, particularly carotene, the essential source of vitamin A.

It should be remarked here, however, that ensiling cannot be expected to *increase* a crop's inherent palatability or feeding value. Silage usually will be no better nor no worse than the crop from which it is made. Forage that is palatable and nutritious when it is put in the silo should be just as good when it is taken out. But ensiling will not improve these qualities; it is merely the best method for fixing and holding them.

There are the added advantages of convenience and labor-saving. Forage can be hauled from the fields in good weather and fed from a central source when the weather is bad. When forage is cut for the silo it is handled only once and under the most favorable conditions. Often silage feeding makes it possible to keep more stock on a given area than dry fodder feeding would permit. When a crop is ensiled, the forage is removed from the land in time for it to be planted for a second crop. Also, silage can be stored in much less space than other feed of the same weight. A ton of hay takes up 400 cubic feet, whereas a ton of silage fills only 50 cubic feet.

An important method of controlling the European corn borer is that of cutting close to the ground corn stalks which are to be ensiled.

# Silage

*Continued*

### Good Silage Crops

Although corn long has been the main crop used for silage, a variety of other crops are utilized equally well by the practice. Grasses, legumes, small grains, and even citrus pulp have been ensiled successfully. Nowadays silage made from hay and pasture crops is coming into more and more favor. Green pea vines, soft corn, sunflowers, beet tops, apple pomace, wet beet pulp, potatoes, and cannery wastes also will make satisfactory silage. But cabbage, rape, and turnips are not suitable to the process, because they make a watery foul-smelling product.

The popularity of corn for silage is deserved, because it is an ideal silage crop. Even though it is not so high in protein, carotene and minerals as legumes, when corn is cut at the proper stage its sugar content forms enough acid through fermentation to make the addition of any preservative unnecessary.

Corn should be harvested for silage about ten days before it would be cut green to shock, or no later than when 90 per cent of the kernels are dented. Seventy-five per cent of the kernels should be hard enough so that milk cannot be squeezed from them.

The Connecticut Agricultural Experiment Station has developed a new type of corn – sweet dent – especially for silage. Large yields result from an unusually vigorous plant growth and larger ear. "The green unhusked ears commonly weigh more than two pounds each and often measure more than a foot in length. Some farmers report their dairy cows prefer the sweet dent silage to straight field corn silage. Chemical analyses show it to be higher in feeding value than regular silage." This sweet dent hybrid is purely a silage type, and the ears should never be saved for grain.

### Sorghums and Hay Crops

The sorghums vie with, if they do not surpass, corn as an excellent silage crop. Sorghum is nearly equal to corn silage in milk and beef production, and often the yield per acre is quite a bit higher than that of corn, especially in the South and Southwest. Sorghums should be cut for silage when the head is in the late dough stage.

Any crop that can be made into hay can be made into grass silage, but legumes or a combination of legumes and grasses make better silage than grasses ensiled alone. Such crops are higher in protein, carotene and minerals than corn or sorghum. They make high-grade silage when cut slightly before the best stage for hay – just after the heads emerge, but before bloom for grasses, and during early bloom for legumes. Alfalfa, wherever it can be grown economically, is an excellent crop for silage, just as it is for hay. Other legumes good for silage are ladino clover, medium red clover, alsike clover, and mammoth red clover. These may be combined with such grasses as timothy, orchard, brome, and reed canary. Grasses are lower in protein than legumes, and the most economical means of providing them with the nitrogen they need for maximum yield is to grow them together with the legumes.

### Standards for Silage

The ideal silage crop must be neither too dry nor too high in moisture content. If it is too dry, it will not pack well in the silo, and the remaining air will allow mold to develop. If the moisture content of the forage is too high, the silage may sour and spoil. Also, juice sometimes leaks from wooden or masonry silos, causing loss of nutrients, to say nothing of the bad odor as it decays. Watery silage injures silo walls, and sometimes exerts such great pressure that the silo bursts. Excessive leakage is most likely to occur from crops having less than 25 per cent dry matter.

At the bloom stage, hay crops may be put into the silo without wilting and with no water added, except that used at the top when sealing the silo. Moisture in ensiled material should be 70 per cent. If this much moisture is not present, then water should be added. Moisture content may be determined by chopping up a sample of the forage with shears and weighing it before and after drying in an oven.

Crops with too high a moisture content may be allowed to wilt in the swath, which will bring the dry matter content up to the recommended 30 to 40 per cent level. Withering should not take more than two or three hours between mowing and loading on a dry, sunny day, and it actually will increase the sugar content per pound. However, if the forage dries out too much, it will not pack properly in the silo and is likely to mold. Wilting is not necessary in a very dry season, or, as has been stated, when crops are cut at just the right time.

### When it is Silage Cutting Time

*Alfalfa* usually cannot be allowed to stand in the field until the proper stage of maturity has been reached for making silage. Unless the dry content of the plant is high, as in a period of drought, alfalfa should be allowed to lay in the field four to six hours for evaporation of surplus water. *Peas* or *vetch* planted with *oats* are ready for silage when the oat heads first show signs of ripening. *Clover* should be allowed to stand until more than half of its blossoms are brown. *Soybeans* and *cowpeas* are ready when the pods begin turning yellow, before the leaves are lost. *Wheat* should be ensilaged when its grain is in the dough stage. *Rye* put in the silo before the blossom stage keeps well, but makes an unpalatable silage with feeding value lower than that of corn.

Forage used for silage should have solid stems, so that only a small amount of air will be left in the mass after it has settled in the silo. Hollow-stemmed small grains must be packed carefully to force out all the air possible. There should be

enough acid in silage to prevent growth of bacteria that cause rotting.

### Are Silage Acids Dangerous?

One of the arguments against feeding silage that used to be, and sometimes still is, heard, was that animals are injured by silage acid. But such arguments have been proved erroneous. Organic acids in silage are much like those produced in the digestive tract of a healthy ruminant. These acids are utilized as food by the livestock, just as sugars are.

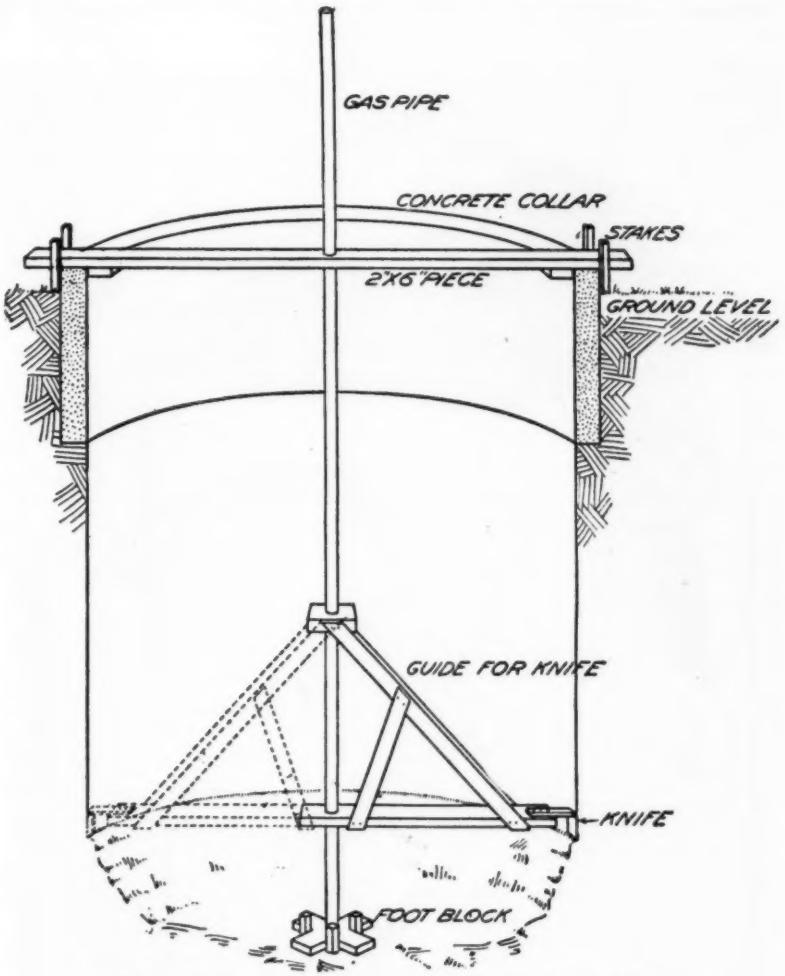
However, corrosive acids are sometimes added to silage as preservatives. These may be assumed to have a harmful effect on the digestive organs of any animal. The Ohio Agricultural Experiment Station, which published a survey of its ten years' work with hay-crop silage, noted that "sulfuric and hydrochloric acids were expensive, difficult to handle, and *injured machinery*. This method is not recommended." As for hay-crop silage treated with phosphoric acid, the same bulletin ventured, "Probably it is not wise to feed phosphoric-acid-treated silage too liberally." Sulfuric acid, which is sometimes used, is hardly to be recommended, either.

Molasses added as a preservative to hay-crop silage often improves its quality and palatability, and tends to increase the carotene content. The food value of the molasses is largely retained, because its sugar is converted into lactic and acetic acids, which have nutritive value.

Ground dry grain also is a good conditioner for silage made from legumes and other hay crops. Adding grain is one method of bringing the dry matter content up to the desired level, and grain increases silage palatability. But silage will keep over long periods if it is packed in the silo so that fermentation promptly exhausts the oxygen and no more air gets to it. Properly cut, stored, packed, and sealed, the loss of dry matter through a three-to-six month storage period should not exceed ten per cent. Otherwise losses may run much higher.

### How to Feed Silage

Care in feeding silage is necessary, because it spoils quickly on exposure to air. Therefore only as much as will be used up at each feeding should be removed from the silo at a time. Frozen silage must be thawed before it is fed. Moldy or rotted silage should be utilized as sheet compost. Horses and sheep are especially susceptible to digestive disorders from spoiled silage. However, the slightly laxative quality of high-grade silage is beneficial to livestock during the winter.




**Pit silo cross section: device keeps walls smooth and plumb.**

Daily rations of silage suggested by Morrison's *Feeds and Feeding* are as follows:

Milking dairy cows, 30 to 50 lbs.

Dry dairy cows, somewhat less.

Dairy heifers, 12 to 20 lbs.

Beef breeding cows, 30 to 50 lbs.

Fattening two-year old steers, 25 to 30 lbs. at beginning of fattening period, decreasing allowance as they fatten until only 10 to 15 lbs. are fed.

Fattening calves, from 10 to 20 lbs., at beginning of fattening period, decreasing to eight to ten lbs. later.

Brood mares and idle horses, 15 to 30 lbs.

Breeding ewes, two lbs. per 100 lbs. live weight.

Fattening lambs, 1½ to 3 lbs.

Another rule for the dairy ration is the substitution of silage for hay on the basis of three pounds for each pound of hay replaced. Except under extreme conditions, silage should

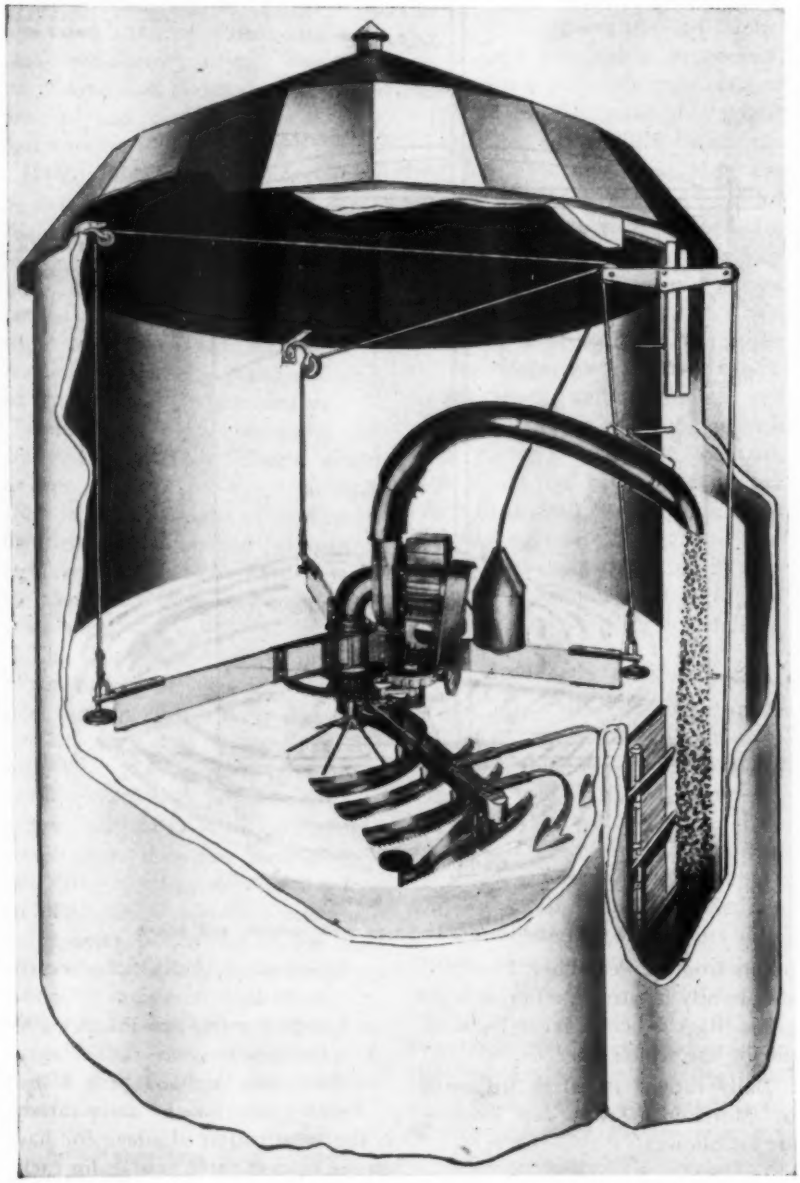
# Silage

*Continued*

not replace more than one half the usual feeding of hay, on this three-to-one replacement basis.

### When Silos Are Impractical

"Not all farmers can use silos to advantage," the United States Department of Agriculture points out in its *Silos: Types and Construction* (Farmers' Bulletin No. 1820). "Many will find permanent upright silos practical for a herd of as many as ten dairy cows or the equivalent in other livestock for which silage is a good feed. When the number is smaller than this, the investment in the silo and in the machinery needed for filling it generally makes overhead costs too high per animal; also it is not usually feasible to build a permanent silo so small that when few animals are fed the silage will be taken down fast enough to avoid spoilage."



**Cut-away drawing of a push-button silo unloader. As the blades agitate packed silage, suction fan draws it into blower tube.**

However, there are a variety of silo types to choose from, with a wide range of cost, and the farmer can be his own judge of which, if any, best fits his needs. The main factors to be considered are the service requirements, the cash and time available, the first cost, upkeep, and durability.

Tower silos are made of wood, steel, concrete, or tile. The latter three constructions have the advantage of attractiveness, durability, and fire and wind resistance. Silage acids act on mortared joints, but a monolithic concrete silo requires little attention beyond occasional painting, and its low upkeep often justifies its higher original cost. Wooden silos are the least expensive of the upright type. These have metal hoops which must be loosened at filling time to avoid crushing the staves by swelling, and tightened when the silo is empty to prevent collapse.

Even a wooden silo represents a considerable investment, and the operator of a small farm may find so much initial outlay uneconomical, if not prohibitive.

Fence and stack silos are low in cost, can be set up on short notice, need no special foundations, and can be placed on almost any site convenient for filling and feeding. Successive rings of strong, small-meshed fencing are lined with heavy paper to keep silage from falling through the meshes during filling, to hold the moisture, and to keep out air. Any building or roofing paper may be used, although there are acid- and bacteria-resistant papers specially made for the purpose. Roughage also may be ensiled simply by stacking it, but a large percentage of loss must be expected. Inasmuch as the principal loss is around the outside of the stack, the larger the stack, the less the loss.

### The Silo Goes Underground

Perhaps the most successful of all

low-cost silos, especially in regions where rainfall is low, are those made below ground. Trench and pit silos have proved satisfactory in the South, Southwest, and Great Plains for many years. These dug silos also are used in North Dakota, Minnesota and other northern states. In fact, the underground silo is the oldest type known.

The pit silo is circular in form, and it may be dug as deep as desired or the ground-water level will permit. It may have a curbing that extends several feet above ground. The soil should be well-drained and of such nature that it will not cave. Soils containing large rocks or sand strata are not good for dug silos because the wall surfaces must be kept firm and smooth. The water level should be three feet or more below the surface. The character of the soil and the maximum height of the water table may be learned by boring a two-inch hole.

Below-ground silos, properly constructed, may serve as well as or better than upright silos. They are not subject to fire or storm damage. They keep silage at uniform soil temperature. It is easy to tramp down the surface of the silage for greater compaction. The below-ground silo should be located at least six feet from the barn wall, and so that it will not get drainage from the barn, feed lot, or manure pit.

### Trench Silo Inexpensive

The Alabama Polytechnic Institute summarized its experiments with the trench silo as follows:

1. The trench silo is easy to build and is inexpensive, requiring mainly man- and mule-labor. (Equipment for construction suggested: two mules, turn plow, slip scrape, pick and shovel.)
2. The trench silo can be built to suit the needs of any number of cows. A cow should consume about 35 lbs. or one cubic foot of silage daily.
3. A long shallow trench is cheaper than a short, deep one. Where increased capacity is desired, it should be obtained by increasing length and width rather than by greater depth.
4. A trench silo will preserve silage satisfactorily. Silage taken from a trench was considered equal in quality to that removed from a concrete silo.
5. The cost of filling a trench silo is less than that for an upright silo, because the power to lift the ensilage and blow it up a long pipe is not necessary.

Whether the silo is above or below ground, filling it requires special equipment and considerable care. Forage must be run through a silage cutter. The more finely chopped the forage, the more densely it packs, making better silage, more easily handled. A tractor-powered blower elevates the chopped fodder to the top of the tower silo. Inside the silo care should be taken to distribute the forage evenly by moving the flexible distributor pipe. Walking about helps pack the material, which should be especially well tramped near the wall, where friction holds back settling. It is important that the last few feet of silage should be levelled off and thoroughly tramped to avoid spoilage at the top.

### Silos Can Be Dangerous

Here a strong warning should be sounded against the danger of gas in silos. Carbon dioxide and other suffocating gases form from fermenting silage soon after filling begins. Gas is a particular hazard in the below-ground silo. Many lives have been lost because of carelessness in entering silos where gas had accumulated. Safety may be tested by lowering a lighted lantern into the silo. If the lantern goes out, do not enter until the gas has been cleared by agitation with a blanket or by raising and lowering a basket on a rope. During the filling period the blower on the silage cutter should be run several minutes before anyone enters.

### Push Button Unloading

Filling the silo can be a relatively simple and pleasant chore beside that of feeding from it the following winter — as any hand who has climbed a silo ladder in sub-zero weather will testify. An ingenious mechanical silo unloader now on the market is said to "eliminate the farmer's most disagreeable chore." Other claims for it are that it increases milk production by keeping silage sweet and fresh through aeration, that it saves a minimum of 200 man-hours a year, that it effects feed savings by dispensing exact portions, and that it prevents silo accidents. Another appealing sales point is that this mechanical unloader handles frozen silage, bringing it down the chute thawed and ready to feed.

The device comes in two sizes, the standard unloader for silos up to 16 feet in diameter, and the heavy duty unloader, used in silos up to 20 feet diameter. Or it may be used in silos as small as 12 feet in diameter when silage is required quicker and in greater quantities.

The entire unit hangs on three cables. These cables converge and run down the ladder chute to a hydraulic winch mounted below. The winch has a ratchet. Each notch on the ratchet means about an inch of silage. Thus, if two inches of silage are wanted, two notches are released and the time switch is set. As the machine operates, the hydraulic winch slowly releases two inches of cable. When the timer cuts out, the machine stops. The user soon learns how many minutes it takes to clear the silo unloader of silage after it has reached the full depth of silage desired.

### Recommended Silage Cuts

It is said that best results can be had with the silo unloader if silage is put up in the cuts usually recommended:

*Corn silage* cut one-fourth inch and not more than two inches long.

*Grass silage* cut one-fourth inch and not more than two inches long, wilted down to a moisture content of not more than 60 to 70 per cent.

This type of silo unloader has been on the market about five years. The manufacturer reports that it has won great favor in the frozen-silage belt where it gets its hardest usage.

**The smelly garbage scows of New York annually drop into the sea enough garbage to make a truly wonderful pile of compost.**

# Bonanza in Garbage

## Cities are learning that garbage should be utilized, not destroyed.

**By JACK VAN CLUTE**

GARBAGE and kitchen wastes in this country amount to millions of tons every year. Most cities, and farmers who have yet to adopt the organic method, consider garbage a routine nuisance to be gotten rid of as quickly as possible.

Conservative estimates place the daily accumulation of garbage in the United States at one and one-half pounds per person. Two-thirds of the population now live in towns and cities, making an urban total of more than 27 million tons annually. Garbage is a bulky mass susceptible to decomposition, creating an urgent disposal problem. Municipal governments spend millions of dollars each year trying to cope with it.

Let's take a quick glance at what some of our key cities are doing with their garbage.

New York City's department of sanitation budget is $51,500,000 an-

nually. During the past fiscal year its ten thousand workers picked up 21 million cubic yards of refuse, enough to exceed the capacity of the Empire State Building 15 times — or to fill the Yankee Stadium a mile high! Whether organic or not, all refuse from New York is disposed of by landfill (for which a "navy" of four tugboats and 42 scows is kept active), or by burning in 11 gigantic incinerators. The new Betts Avenue (Queens) incinerator, being completed this year at a cost of about $4,000,000, alone will burn some 750 tons daily.

### Blind Leading the Blind

That is the staggering amount of work and money expended for refuse disposal in our largest city. The procedure, with but slight variations, is the same on a lesser scale on down the line to smaller cities.

Boston's Commissioner George G. Hyland reports: "There are about 100 farmers who collect especially rich garbage from restaurants, hence this amount (total municipal tonnage) is unknown." He adds that Boston is planning the erection of incinerators to "burn all its garbage."

Philadelphia had more than 200,000 tons of garbage in 1949, all of which went directly into either incinerators or hogs. "84 per cent was collected by farmers without charge to the city," Thomas Buckley, department of public works director, reports. "The balance was collected by city forces and processed at municipal reduction plants where by-products, especially grease, are extracted. Ultimately, total disposal will be by reduction or incineration, or perhaps a combination of both."

Seattle buries all its garbage — some 300,000 tons a year sanitation engineers estimate.

Nearly every home in Los Angeles has its private incinerator, but that sprawling city still collects a daily average of 659 tons of pure organic garbage, all of which it sells to hog raisers. (One of these, the largest farm of its kind in the world, marketing 50,000 hogs a year, receives 71 per cent of Los Angeles' garbage in railroad tank cars.) This revenue pays only about 18 per cent of the collection cost.

Denver is another city which contracts with hog raisers to take its garbage. "No study has been made of monthly tonnage," reports Robert Cameron, sanitation director. "The city pays $50,000 annually for collection service."

Survey shows that the majority of smaller municipalities follow the lead of bigger cities in garbage disposal, the organic mass being dumped and buried, destroyed in incinerators or sold, usually on a collection cost, for hog feed. In the latter case the resident who pays part of the collection cost when he gets his tax bill, and then pays seventy cents a pound for pork chops, may wonder where "grain-fed" pork comes from.

So most American garbage goes either to the incinerator or to the hog pen. If it is buried, there is hardly any benefit. If it is fed to pigs, as approximately 47 per cent of it is, it poses a serious health menace. Trichinosis, a disease communicated to human beings through eating infected pork, is spread in this way. And if garbage is burned, vast amounts of organic matter are forever lost to the soil.

### Microbes at Work

But so much for the dismal side of the picture. Fortunately there is a more encouraging aspect, and the day may soon be at hand when garbage will no longer be regarded as sheer waste. A new line of thought is slowly breaking.

More or less active research directed toward the large-scale utilization of garbage as fertilizer has been going on for the last twenty years. But only recently have garbage decomposition systems been developed which are capable of handling the refuse of entire cities. Now it appears that a practical way has been found to restore this long wasted organic matter to the soil — where it belongs.

One hindrance to proper composting of garbage had been lack of understanding as to how speed of decay could be controlled. It has been found that six factors influence the speed of decay: microbes, air, moisture, acidity and alkalinity, ingredients of the raw material, and the size of its particles.

Knowledge of ways to control these factors has now been made available through research discoveries, and each can be regulated to hasten time of decay from months or weeks to a few days.

Fast composting entails the use of controlled microbes. These are separated from the thousands of different microbes that nature uses to break down organic matter, by experimentally culturing them in samples of the material to be decomposed. An enormous amount of the selected microbes is soon grown. They are mixed with the raw garbage. Thus is eliminated the usual time-lapse microbes in the soil take to multiply and spread throughout the mass. Great progress has been made in determining the fastest-working types of bacteria and inoculating fresh garbage with them. Once a garbage composting plant has started operating, either the selected bacteria cultures may be used, or small amounts of the microbe-laden finished compost may be returned to the raw garbage. Either method reduces the decomposition period to a minimum.

### Garbage into Dollars

A mechanical device which at least supplements this process of making garbage available to the soil in short order is known as the digester. One of the most highly developed of these has been put into operation by Joseph Frazer, a founder of the Kaiser-Frazer Corporation.

Frazer's digester looks like a huge silo. Inside it has large rotating arms to keep the mass of garbage continuously in motion. First the garbage is finely shredded by a separate machine. When garbage is shredded well, the inoculating bacteria can penetrate rapidly every cell of the raw organic matter. After the mass is placed in the digester, a flow of correctly tempered and moistened air is turned on. All bad odors

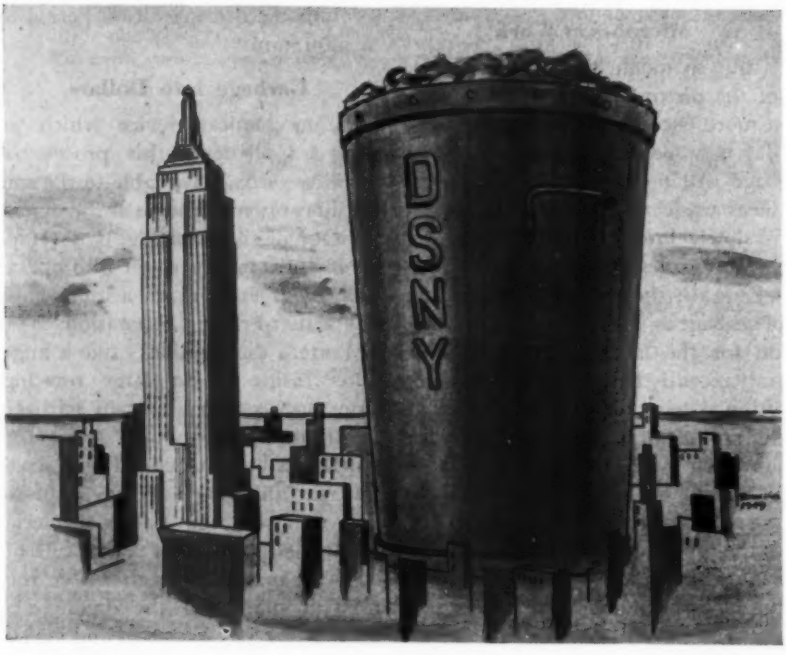
# Bonanza in Garbage

*Continued*

quickly disappear, the bacteria begin their extremely fast multiplication, and soon the one-time waste is transformed into valuable plant nutrients. As the finished compost is taken from the bottom, the top of the digester is being continuously charged with fresh garbage.

It is true that some experts in the garbage composting field take a dim view of the digester, regarding it as merely an expensive and altogether unnecessary gadget. It is their opinion that the cheaper, if slower, method of turning garbage into compost by the simple heap process is the only practical way to make use of the millions of tons now going to waste. Also, they say, the digester may prove too costly for many communities, especially as nothing more is needed than an open field, a grinder, proper bacteria cultures, and machines for moving and turning the treated mass. Two handicaps to the heap method should be mentioned, however – those of climate and weather. Freezing temperature slows down bacterial activity. And unless the heaps are under shelter, rain will leach out some of the nutrients.

**Garbage fills can create a serious health hazard. Cities are learning that organic wastes can be much more sanely utilized.**




**This graphic comparison shows just how much garbage a city can waste in a year.**

Furthermore, it has already been proved that the digester can handle conglomerate city garbage at less expense than that of incinerators.

Frazer Products, Inc., for example, ran a pilot digester at Mt. Wolf, Pa. with such success that composting garbage is no longer regarded as a visionary scheme by many municipal sanitary engineers. Frazer recently has started the large-scale production of organic fertilizer in the Chicago Union Stockyards, using the patented digester.

### A Few Progressive Cities

Allentown, Pennsylvania has made experiments with garbage composting processes. Some Pacific coast cities are the more favorably inclined toward garbage-compost plants, inasmuch as one cause of the smog evil is smoke from the incinerators.

Miami, Florida formerly paid $350,000 a year for its garbage collection, with little if any of the refuse being salvaged for soil. Today the city has a twenty-year contract with the Florida Caribbean Bio-Thermal Operating Company whereby the firm is paid collection costs, takes over all city garbage disposal, and uses the waste in manufacturing an organic fertilizer. By 1952 the company expects to have a $3,000,000 garbage-composting plant turning out organic fertilizer on a big scale.

Back in 1915 Milwaukee, Wiscon-

sin, faced with a stream pollution problem, took a pioneer step in waste disposal. The city constructed sludge plants to handle sewage and let nature take its course. Bacterial action soon put an end to what had been a problem. The plants serve an area embracing over 150 square miles with a population close to a million. The finished product is sold under the trade name of Milorganite.

Reading, Pa., collected 16,871 tons of garbage in 1949, all of which was reduced in city plants to grease and tankage, the latter a concentrated form of organic fertilizer. Now, with its present equipment outmoded, the city is studying several plans for composting all its garbage, says Charles T. Stoner of the Public Works Department.

In 1926 San Fernando, a small island city within the corporate limits of Los Angeles, purchased a sewer farm and installed an activated sludge plant. After bacteria had done their work the sludge was pumped out to dry in big slabs. Residents who pulverized the slabs and used them to fertilize lawns, flowers and shrubs had show places within a year. However, at the same time San Fernando garbage went to a hog raiser.

City engineers, especially those in smaller places where initiative is less hampered by office routine, are on the alert for new ideas, are facing municipal problems with open minds. Researchers in universities are poring over data and microscopes, seeking new ways for better living. Health services are expanding over the country, stressing the latest in better foods.

And the growing popularity of organic farming shows that farmers are eager to do their part in producing food the way nature intended.

### Waste Can Become Wealth

We have raised bumper crops — yes, boosting many farmers into higher income brackets. But what profit wealth if nutrients are lost? As the use of chemical fertilizers increased during the past decade, the protein content of corn dropped one per cent a year. True, man cannot live by corn alone. But as corn goes, so do other grains; the protein decrease is noted in other foods grown by synthetic fertilizers. In our rush for greater yields we mine and dope the soil, forgetting that nature never came out of a test tube in the first place.

With about two-thirds of our population residing in cities, the daily garbage total (exclusive of villages and farms) is estimated at 150,000,000 pounds, or 27,375,000 tons per year. Broken down to one-half weight by bacteria, that garbage total would make over 13,000,000 tons of compost. And how much fertilizer did the world need the past fiscal year? Here's a little irony for the soil:

Last August newspapers ran a "science" story released from Washington, D. C., wherein the Food and Agriculture Organization of the United Nations announced a record amount of fertilizer produced: "Enough for the first time since World War II to satisfy world demands!"

For the year ending last June the total was 13,000,000 tons, an all-time high. The report concluded: "In the coming year — barring effects of the Korean conflict — F.A.O. commodity experts predict fertilizer output and consumption will go up another seven per cent." The specific kind of fertilizer produced was not given, but are we shipping huge tonnages of manure, compost and ground rock abroad? Obviously the reference made is to chemical fertilizers.

Meanwhile we have over a billion acres of farmlands, including thousands of worn-out farms, sadly in need of the humus garbage could supply. As long as we have people we'll have garbage. We have a garbage compost potential capable of meeting every fertilizer demand.

And researchers are busy on the project. Max J. Panzer, sanitary biologist of the University of California, states that results of "Disposal of Organic Waste by Composting," an experimental project underway for some time, will be publicized shortly.

Today many of our leading cities consider garbage a nuisance to be quickly burned, buried or fed to hogs; tomorrow it may become a resource to be composted.

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### Develop Large Enough Farm Business

Your farm business should be large enough to require 24 to 30 months of well-equipped — but not overequipped — labor a year.

That's the observation of M. L. Mosher, Illinois College of Agriculture farm management specialist.

It will be pretty hard, he adds, to raise a family of three or more children and have good farm living with less than this amount of work.

If you're tied to an 80- to 160-acre farm, you may develop a large enough business by any one of several plans:

Grain farmers may enlarge their operations by boosting soil fertility, by farming more land, and by producing certified seeds. A few may grow vegetables, fruits and flowers.

Livestock farmers who are starting a new enterprise should go into it gradually and learn as they go. Any intensive livestock business must be very carefully handled if it is to pay.

An intensive hog business has helped more men pay for 160-acre farms and take good care of their families than other common enterprise, Mosher has found. But you must be a better-than-average hog raiser to make hogs pay on purchased grains.

Dairying is a close second to hogs, especially where pastures can be improved to provide lots of high-quality forage.

Poultry production has changed many small farms into profitable businesses. An 80-acre farm will support a large chicken or turkey business.

# Organic Farmer Bob Seeds

## Part VI of 200 years of Organic Farming in the U. S. A.

**By ALDEN STAHR**

IN THE last issue Bob Seeds, organic farmer of fifty years ago, told how he "burned the midnight oil" studying the soil and how he restored a worn-out farm to abundant productivity by applying organic methods. Now let's see what he had to say about commercial fertilizers, flood control and other subjects:

Every plant needs the balanced ration as well as the cow that gives milk or the hen that lays eggs. The dairyman will go into the stable, look the cows in the face, and say, "I will make you give milk," and puts a balanced ration in their trough for that purpose. A chicken man will figure out what it takes to make an egg, make the conditions all right, and give the old American hen the material to make an egg, and she's just got to lay or bust. These men have been going up and down the land, talking a balanced ration for a cow, etc., but who ever heard any one talking a balanced ration for a plant till Bob Seeds began it some years ago. No man can put a balanced ration in a com-

mercial fertilizer sack, like that released by nature. If all farmers were not trying to balance that ration, they would all use the same brand of fertilizer; and thousands of dollars are wasted every year in the eastern United States by the farmers trying to balance that ration.

This last year, 1907, I have been lecturing in the state of Nebraska, and have learned that where they had used nitrogen, potash and phosphoric acid, separately, on wheat, the nitrogen showed by far the best. Hence, while I know that any vegetable matter will help the soil, I believe that crimson clover, red clover, sweet clover, and alsike would be better for that soil than turnips, rape or rye; because it would gather the nitrogen from the air, and balance their soil ration quicker, that they have unbalanced by raising corn.

I believe the nitrogen the western farmer has was given him with nature's blanket, which I have so often talked about, and the farmer who watches this blanket and helps nature will have nature help him in return.

I can take pure corn meal and kill little pigs with it. I can get a man's fattening hogs in such a condition with pure corn meal that he will have to kill them to save their lives.

I have taken nitrate of soda and gone into my oat field and kept every grain out of the oat head by unbalancing the ration.

I was talking along the line of the blanket in Bucks County, Pennsylvania, a few winters ago, when a farmer got up and said he had covered one-half a field of grass with barnyard manure and the other half with pure clean straw. The straw-covered part was just as fertile when plowed and cropped as where he put the barnyard manure. I said, "Hold on, you are not telling all the story;" and when I got him into details he said they had threshed in the field and he hauled the straw from the thresher in July and covered one half of the grass field, and the next winter he covered the other half of the field with barnyard manure. I said "That will do." The truth was he covered one half of his grass field with straw in July, and it was a blanket holding the moisture when he had the heat. It benefited the mechanical condition of the soil, disintegrated the soil, and unlocked some of that plant food that I talked about being locked up a while ago, and equaled the plant food in barnyard manure put out in winter-time when there was no heat.

People sometimes look at me when I say that the floods around Pittsburgh and on the Ohio River are growing worse and more destructive every decade, because as the forests of western Pennsylvania and eastern Ohio are removed, and the farmers work the vegetable matter and humus out of the soil, the water-holding power is gone. Put a forest over western Pennsylvania and eastern Ohio, and the vegetable matter and humus back in the soil, and you

**Bob Seeds talked the organic method to farmers all over the middle west—without realizing it.**

# Organic Farmer Bob Seeds

*Continued*

cannot have a flood at Pittsburgh, nor will you have low water.

When I was at Clarinda, Iowa, driving out through the country, I noticed on one side of the road, that the corn was a much greener color than that on the other side. One field had been cropped in corn much oftener than the other, thus drawing on the store and taking out the nitrogen of the soil, until the corn was getting to be a yellow color. In many places through Missouri, Nebraska, Iowa and Illinois I noticed that the high places, or ridges, through the fields were beginning to produce yellow-looking corn, while at the base of this hill or ridge the corn was of a dark green color. The season of 1907 was one of the wettest in many years. I crossed and recrossed the Missouri and Mississippi rivers many times, in attending Chautauquas, from June 15 to September 12th, and I believe that as much decayed vegetable matter, humus and plant food went down those two rivers as the farmers in those sections used in raising their crops that year. This was not so before the prairie was broken. The more the vegetable matter and humus is lost from the soil, the more the water runs off; and the more the water runs off, the more and the faster is takes the vegetable matter and humus. In other words, the poorer the soil gets, the faster it goes; hence, the high places in the fields show yellow-looking corn first.

*Listen to me. It is much easier to take care of it when you have it than to put it back after it is gone.*

Nature has her way of doing things, and they cannot be changed; and how can we expect to have nature help us when we are determined to be against her all the time?

When raising early potatoes for the early market when tops are green, we had to haul the tops off the patch. I hauled them on a poor knob in a grass field that was going to corn the next spring. Those tops laying there the balance of the summer, as a blanket holding the moisture when we had the heat, released enough of that plant food that I talked about being locked up; so when we were husking the corn in the fall, I stopped the men and called their attention to the length of the ears, the minute we struck the place where the tops had been put.

In Pennsylvania in the last eight years, men in my audiences have put up all kinds of arguments and questions against me on this subject. At Beyers, Chester County, winter of 1904 and 1905, I stepped out on a platform to talk on the soil. Before I got started, a man asked me a question, and the audience kept firing questions at me for one hour and a quarter; then I sat down, without saying one word of my lecture.

At Selinsgrove, Snyder County, I had twenty-five or thirty men on my back at one time, and the chairman of the meeting offered any man a dollar who could corner me. I say this to show that I have fought out every inch of the ground on the platform and in the agricultural papers. They even went so far as to write to the largest agricultural institutions, and asked them to call me down for preaching a false doctrine.

I am a vegetable-matter crank. If I were to go somewhere to preach the gospel in some church, I would get to talking vegetable matter before they could take up a collection.

You can dig a well and throw the soil from two hundred feet under the surface out to the air and frost, heat and moisture, and nature will cover it with some kind of vegetable matter. So it is not my particular way of making the soil fertile that I wish to impress upon you, but I want to point out that this is nature's way; and, while you may find a much better plan and more valuable plants than I have used, you cannot improve on nature's way.

Some old farmers in my township winked their off-eye and said I would sour the ground plowing down green stuff, and would get that old farm worse than ever. Some of those men have since been elected assessors in my township, and put twenty-five dollars additional valuation per acre on my farm.

### Improving the Soil from the Organic, or Animal Matter Standpoint

My grandfather came from Ireland years ago, married a man's daughter, with whom he got one hundred and ten acres of woodland. He cleared the land, erected buildings, and raised big crops because he could not help it. Some years after he got the farm, it did not produce crops as it did at first; and he began, as all the other farmers in my part of Pennsylvania did, to sow Nova Scotia plaster. Everywhere they threw a handful of the plaster the land yielded a larger growth, and I used to sit on the top rail of the old worn fence, with my arm around my grandfather's neck, while he would pick out a certain spot in the clover field, or row of corn in the corn field, where the boys failed to put Nova Scotia plaster. Soon many plaster mills were built on the streams of Pennsylvania, and hundreds of boat-and-car-loads of the plaster came up into the state. The day came when I carried the plaster bag on my shoulders and plastered the row of corn along the fence heavily, the next row a little lighter, and so on, until I would not put any on. This practice was continued, and the day came in Pennsylvania when you could not see where you put the plaster; and today the old plaster mills are known only on the pages of history.

The farmers kept on cropping the land until it was not yielding so well as it had been, and they wanted to make it more productive. Therefore, they began down in eastern Pennsylvania to put up lime kilns and continued to do so until they were as thick as flies around a sugar barrel on the fourth of July. They began to burn lime and to haul it out until the state was a great white sheet. Every place they threw a shovelful

of lime it made the earth richer and more productive; and in my section old men and their boys used to lean up against the old worn fence, and look over into the field where they had put on lime, and wonder what they would do with all the crops they were raising. Today the father is dead, and the boys are leaning up against the same old fence, looking over into the field, and wondering what in thunder is the matter with the land; while the lime kilns are covered with moss and ivy, and birds are building their nests in them. In many places you could not get your board in exchange for spreading lime for them, and all because they have neglected the vegetable matter necessary for the soil.

What have they done? They have used the lime which is a key that unlocks the great store of plant food that is locked up in the soil, to make it available for plants. They have produced vegetation; have taken it away; and have not given back to the soil anything in return. You could not farm a field twenty years in succession with the use of lime alone. It is not the fault of the lime, but the fault of the man who did not take care of and handle rightly that which the lime gave him.

The farmers kept on cropping the land, and, as it was not doing for them what it had done, they began down east again and so came up through the state, using commercial fertilizers until last year the farmers in the state of Pennsylvania went down into their pockets and brought up eight million dollars and put them in commercial fertilizers. What for? To have some place to put their money? Not much! They did it to make the soil do what it had done for their grandfathers for nothing, and all because the decayed vegetable matter and humus had been worked out of the soil.

We do not look at things as they do in some of the old countries. Think of about eighty-three dollars worth of plant food running out of most of the barnyards of this country in one year, and barnyard manure losing sixty per cent of its plant food value in one hundred and four days, by lying out in the open barnyard!

I watched this go on, and the colored water run across the public road into the Juniata River, until I could stand it no longer; so I covered the barnyard and puddled the bottom with yellow clay, both barnyard and stables, in order to hold this liquid manure.

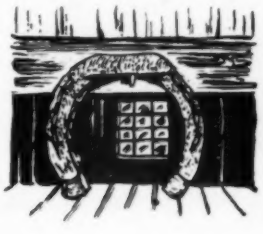
### The Way to Handle Barnyard Manure

It is much easier to do work in a book, or when talking before an audience than out on the farm. If I could have my own way and do it, I would keep the stable manure under cover—keep it from heating; and then in the spring, when the grass in my mowing field was three or four inches high, I would haul the manure all out in one day, and spread it evenly over the grass field.

That night I would lie in bed and have a thunder shower come up and leach the fertility, or plant food, out of the manure down among the roots of the grass that were alive and active, ready to take up this plant food. I would feel so much better than if it were put on bare ground, or plowed under.

Think of my grandfather leaving the manure in the open barnyard, to lose the sixty per cent of its plant food value, and then, when the spring work was done, hauling the remaining forty per cent out on the cornstalk field (fallow field), pulling it off the wagon with that old, ugly, crooked-handled dung-hook that hung in the barn – that robber that caused more mortgages to be put on farms than any other implement of its size in the world.

There the manure would lie in piles until they went in to plow the field. After opening the land between the rows of manure piles, they would spread the manure, while the horses were resting, by throwing it around in chunks the size of my head, and plowing it down to the bottom of the furrow. So the forty per cent was doing no good, and did not produce a blade of anything until something was sown in the field and the roots got down to the manure.



There are some people doing this today. Stable manure is never better or more valuable than the day it is made; but, as we cannot always get on the fields, I covered my barnyard.

I want the stable manure on the grass because it is a nitrogenous food, and produces stalks, stems and leaves; and stalks, stems and leaves are hay and vegetable matter. When you plow down stable manure you wait a long time for it to put anything back in the barn. When I put it on the grass in winter and early spring, I put hay in the barn in June and July that is produced by it. When the growing weather comes, it is not long until you can see the effects of the manure on the grass.

One ton of manure on the grass is equal to two tons plowed down.

Then after the plant food is leached out of the manure down about the roots of the grass, you have the organic matter left on the surface as a blanket to hold the moisture when you have the heat. Nature, with these two to disintegrate the soil, benefits its mechanical condition, and releases and makes available the locked-up plant food that the plant cannot otherwise get. The man does not live who can get this locked-up plant food in any other way but nature's way; and, when he does get it, it is nearer a balanced ration for the plant than any living man can put in a commercial fertilizer sack. Plants need this balanced ration just as much as do the cow, pig or chicken.

Is that all? No, indeed. When the farmer holds the moisture in the soil, when he has the heat, the same as nature does, the little earthworms, or fishworms, the farmer's best friend, come up to the surface and work

there; and when you see the little earth castings laying around, caused by these little creatures, you know that they are working for the farmer, disintegrating the soil, and releasing, unlocking, and making available some of that locked-up plant food that I have been speaking about. If you cannot hold the moisture when you have the heat, the worms will not come to the surface to work for you.

Last week in Montour County, Pa., a man in the meeting got up and said that when he began to manure his cornfield (for the next spring) in the months of August, September, October, November and on through the winter and up to the time he began to plow the field in the spring, he had noticed that the part of the field manured first was more fertile and better than the part manured later. In other words, the longer the manure lay on the field, the better and richer it was. These little testimonials come up every now and then to back up my idea. If he had mowed the field and held it over to the next year, it would have been better still.

### *In a Nutshell*

It's sometimes interesting to boil down anything we read on agriculture and review the essence of it. Here is the essence of Bob Seeds' organic farming:

1. Many years prior to Faulkner, he spoke of the inexhaustible plant food in the soil and told how to release this by means of decaying vegetation.
2. Told how to obtain nitrogen from air with legumes.
3. Used deep-rooted cover crops to tap plant food in subsoil.
4. Urged spreading of manure as soon as made, or use of covered pit for storage.
5. Saved both solid and liquid manure.
6. Practiced rotation of crops.
7. Said it is not possible to put a balanced plant ration in a fertilizer sack and that a farmer should never let his soil get into such poor condition that he had to rely on commercial fertilizers to make any kind of a crop.
8. If all farms were organic there could be no floods because the humus would take up rain and release it slowly.
9. High organic content of soil makes it possible to work in wetter weather and drier weather, earlier in spring and later in fall.
10. Worms are the farmer's best friend; they disintegrate the soil, release plant food and make it available.

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# Climate and Cattle

IF CATTLE could be made to produce beef and milk in warm climates at something like the level attained in temperate climates, a great advance would be gained against under-nourishment. To this end, many tropical countries have tried to improve their stock by importing productive animals from temperate zones, either for pure or cross breeding; but only brief increases in production are achieved before the imported stock and their cross-bred progeny show deterioration. One authority suggested that the most useful thing to do would be to isolate studs of milking strains of tropical zebu cattle under European control in a country where the herds could be expanded free from disease and made available to countries that needed them; but J. D. Findlay and his colleagues at the Hannah Dairy Research Institute, while commending this proposal, think that the fundamental question of temperature regulation in cattle should also be studied. As a first step to such a study Findlay has now reviewed existing knowledge.

In hot climates, he says, tropical cattle can graze longer than those imported from temperate climates, and simple field tests show that their body-temperatures are less influenced by high air-temperatures and humidities. Their respiration-rates are also less liable to increase, and by this criterion woolly coated animals are less able to tolerate heat than those with glossy coats. Contrary to what is found in man, the pulse-rate of cattle is increased by heat only as a prelude to complete breakdown under extreme conditions. The skins of tropical cattle often allow considerable water loss by diffusion, but it is still uncertain whether they are capable of active sweating. These and many other points of animal physiology require further investigation by the refined methods commonly used in human physiology. Much of our information about climatic effects on farm animals has been gained by simple methods, and though some of these are admirable for their purpose others are crude and inaccurate. For their own investigations the Hannah Institute staff built a psychrometric room, suitable for the study of one cow at a time, in which the temperature, humidity, and air movement may be varied independently and kept almost constant at any given level. This room and its adjacent observation chamber are equipped with the modern apparatus needed for accurate and continuous recordings of the environment and the cow's reactions.

*—From The Lancet*

# Customized Blueberries

## Insects are no problem in this organic patch.

By JEANNE PONTIUS RINDGE

MANUFACTURERS long have offered clothing to fit the size of the purchaser. It has taken the J. Boreaus, of Batavia, N. Y., to offer blueberry picking to fit the height of the picker. What is more, the blueberries are disease-free and naturally grown.

In the forty acre blueberry patch, there are not only "little, low" bushes, "medium size" bushes and "great big" bushes, like the three bears (some up to 12 feet high), but also great big berries, medium size berries, and little berries – nine varieties in all. The big ones, really huckleberries, are almost black in color and the size of large currants.

The Boreau blueberry patch is one of those natural phenomena which delight not only the palate, but also the soul of the blueberry picker. For there is something about picking blueberries – a sort of reverence perhaps – more pronounced than with other varieties of fruit gathering.

Imagine the joy, therefore, of acre after acre of blue-hung bushes, adjusted to your individual height so that – with a tin can tied to your middle – you can pick with both hands, by the handful, and as rapidly as your coordination will permit. The Boreau's charge a reasonable sum for the privilege of picking berries yourself, or they can be purchased already picked.

Forty years ago, this acreage was so much "useless," peaty muck surrounded by forested swamp. It was a

(*Continued on page 52*)

**Meet Mrs. Julius Boreau, whose organic 40 acre plot of blueberries produced over 8000 quarts in the 1950 season.**

# Grasses of The Western Gulf States

## Don't skip this article if you live in Arkansas, Louisiana, Oklahoma, or Texas.

By W. M. NIXON

*Western Gulf Station*
*Soil Conservation Service*

ANNUAL, biennial and perennial legumes are used extensively as cover and soil improving crops in the soil conservation program throughout the Western Gulf Region of the Soil Conservation Service. This region includes all of Texas, Oklahoma, Arkansas and Louisiana. Practically all the land area in these states is organized into Soil Conservation Districts.

The legumes most commonly used are hairy vetch, sweet clover, alfalfa, crimson clover, sericea lespedeza, kudzu, austrian pea, singletary pea, annual lespedezas, cowpeas, crotalaria, guar, mungbean, soybean, velvetbean and alyce clover.

Hairy vetch, austrian pea, singletary pea and alfalfa are planted in the fall. Sweet clover is also fall planted in Central and South Texas and in Louisiana. In the northern part of the region sweet clover is planted in the spring. The other legumes mentioned are planted in the spring or early summer. Legumes do best when planted on a clean firm seedbed. All legume seed should be inoculated with the proper inoculant before planting.

Most of the legumes used for erosion control and for soil improvement provide good grazing and produce good hay crops. They are also good seed producers and provide a profitable cash return when harvested for seed.

In the eastern part of the region the legumes are usually turned completely into the soil and followed by crops such as cotton or corn. In the western part of the region the practice is to mulch the legume residue into the soil with a disk or stalk cutter prior to the planting of such crops as grain sorghum, wheat and cotton.

In the past ten years great progress has been made in the production of legume seed in this region, which has resulted in their more extensive use in conservation cropping systems.

A rotation of cotton, wheat and biennial sweet clover, as compared to continuous cotton, over 18 years at the Red Plains Conservation Experiment Station at Guthrie, Oklahoma, reduced soil losses 76 per cent and water losses 33 per cent. In the same rotation the yield of cotton was increased 141 pounds of seed cotton an acre.

At the Blackland Experiment Station, Temple, Texas, a corn plot on four per cent slope lost 8.5 inches of water and 20.4 tons of soil an acre in 1946. This same plot, cropped to corn again in 1947, lost 4 inches of water and 11.7 tons of soil an acre. A nearby plot in oats during 1946 lost half an inch of water and half a ton of soil an acre. The plot, when cropped to cotton in 1947, lost 3.3 inches of water and 16.2 tons of soil an acre. Another plot cropped to sweet clover in 1946 lost half an inch of water and .3 of a ton of soil an acre. This plot, cropped to cotton in 1947, lost only 2.3 inches of water and 3.3 tons of soil an acre.

While the erosion-resistant crops of sweet clover and oats were actually growing on the land there was little difference in soil and water loss from each plot. The big difference occurred the year following the erosion-resistant crop. These results show clearly the value of deep-rooted legumes for soil and water conservation.

The value of legumes in providing organic matter and nitrogen and increasing crop yields is well known. At the Blackland Experiment Station, Temple, Texas, corn yield in a two-year rotation with Hubam sweet clover was increased 35 to 40 per cent over that of continuous corn. Cotton yield in two-year rotations with this deep-rooted legume was increased 50 to 100 per cent over that of continuous cotton.

Field studies on the gray soils between the Blackland Prairie and Forested Coastal Plains of Texas reveal reasons for yield increases where legumes are used in the cropping system. These soils have very tight subsoils and poor soil moisture relations.

Where cotton has been grown continuously 40 years or longer, the yield is about 100 pounds of lint an acre. Legumes in the cropping system two or three years usually increase yield to three-fold. The studies disclose that the structure and physical characteristics of the soil have been so improved by the legumes that water is taken in more than twice as fast and that the

amount of water stored or held per inch of soil is increased by 40 per cent. The extra one-tenth inch of water held in each inch of soil, even if in only the surface six inches, supplies the necessary moisture to translate the added nitrogen and other available fertility into increased crop yields.

Of the perennial legumes adapted for use in conservation cropping systems on upland soils in areas of the Western Gulf region receiving as much as 40 inches of rain annually, lespedeza and kudzu are the best.

These two legumes afford excellent erosion control and provide an abundant mulch. Their extensive root systems improve soil tilth and add large amounts of organic matter and nitrogen. They are also both good hay and grazing crops.

Farmers have increased corn and cotton yields several fold by using sericea or kudzu.

Alfalfa is another good perennial legume which, on adapted soils, fits well in a conservation cropping system on irrigated and dry land.

One of the most promising uses of soil-improving crops is found in the rice-pasture rotation developed by Dr. W. B. Sturgis and R. K. Walker of the Louisiana Agricultural Experiment Station. This rotation which usually consists of two years of rice and three years of pasture (white clover and Dallis grass, Kobe lespedeza and oats) is a great improvement over the rice-idle land rotation. In addition to producing beef while the land is in pasture, this system has increased the yield of rice more than 11 barrels an acre on land following improved pasture, *without using fertilizer on the rice.*

The original cropping system of the Bertinot-Dugal farm near Opelousas, La., in the Grand Coteau Ridge Soil Conservation District, was to grow rice one year and allow the land to lie idle one year. The rice production was eight and one-half to twelve barrels an acre. Now the cropping system is to grow white Dutch clover two years and rice one year. (Barnyard grass, Bermuda grass and carpet grass volunteer in the clover). Rice production following the two years of improved pasture averaged 17 barrels an acre. One cut of 30 acres averaged 23 barrels an acre.

The farm originally carried 60 mature cows, with an average of 50 per cent calf crop. The calves were weak, unhealthy and many died. The cows were always poor in winter, requiring considerable feed to keep them alive.

The farm now carries 120 cows, with a 90 per cent calf crop. These calves are strong and healthy. The cows keep fat all year with very small amounts of feed. In addition, several thousand dollars worth of clover seed has been harvested.

Adolph Daigle, a cooperator of the Acadia Soil Conservation District, harvested more than 20 barrels of rice an acre on his farm near Church Point, Louisiana. This yield was produced by 60 acres planted to

**This close-up view of blue lupine shows the root nodules that are important in making nitrogen available to the plant.**

# Western Gulf Grasses

*Continued*

rice after the land had been in improved pasture. Previous yield from the same acreage was 12 barrels an acre.

Four years ago Mr. Daigle established white clover pasture on part of this acreage, and lespedeza pasture on the rest of it. A seed bed was prepared carefully before clover was planted. The pastures furnished excellent grazing.

Pastures were disked and harrowed twice in December 1947, to turn the clover and grass under so that decomposition could take place before the land was prepared for the rice crop in the spring.

Tom Parker, a cooperator with the Davy Crockett-Trinity County Soil Conservation District in East Texas, seeded 35 acres to Singletary peas in the fall of 1945. He harvested some seed in the spring of 1947, and used some of the acreage as green manure. The peas yielded an estimated 10 tons of green manure an acre. After the seed harvest, he planted corn and peanuts on June 16. Rain fell on June 19, but there was no more rain until September 16.

The corn made about 35 bushels an acre, a yield comparing favorably with that of the best spring-planted corn in the district. Most of the peanuts were hogged off, but three acres harvested for seed yielded 99 bushels an acre. Since the summer was one of the driest on record, Mr. Parker attributed much of the success of the late-planted crops to increased water-holding capacity of the soil brought about by disking and incorporating the Singletary peas in the topsoil to form a mulch. At all times during the summer, the soil in this field was moist and free from crusting or baking. As a result of Mr. Parker's experience, Singletary peas are now being used extensively in the district.

Singletary pea plantings have been successful in the Western Gulf region as far west as the 35-inch rainfall belt. Where adapted, this crop appears to be one of our best legumes for controlling erosion and improving the soil.

Orvis West, Hinton, Oklahoma, in the North Caddo Soil Conservation District, doubled the yield of his grain sorghum by using biennial sweet clover to condition the soil.

Jack Walbaum, Calumet, Oklahoma, in the Central North Canadian Soil Conservation District, increased his wheat five bushels an acre and oats ten bushels an acre with biennial sweet clover.

The nitrogen and organic matter added to the soil by Hubam sweetclover produce dramatic results on succeeding crops.

Cotton yields on Alfred Ballman's farm near Riesel, Texas, rose from 135 to 240 pounds of lint an acre; corn yields increased to 34 bushels from former yields of 22 bushels an acre.

On irrigated land in the western part of Texas and Oklahoma, a cropping system of alfalfa or grass and legume pasture for four or five years in rotation with row crops such as cotton or grain sorghum is being used to maintain and increase soil productivity.

Cooperating with the El Paso-Hudspeth Soil Conservation District in west Texas, R. F. Cook rotates three to four years of alfalfa with two or three years of cotton. He gets one ond one-half to two bales of cotton and about six tons of alfalfa an acre. Some of the land in this irrigated valley has been in cultivation for more than 250 years and the fertility is still at a high level today as a result of alfalfa and cotton rotations.

On the rich Mississippi River alluvial soils at the Northeast Louisiana Experiment Station a six-year average production of cotton alone was 1,157 pounds of seed cotton an acre. The average for the same period where vetch was used as a soil-improving crop was 2,188 pounds.

H. F. Sisk, a Marianna, Arkansas, farmer in the South Crowley Ridge Soil Conservation District, got half a bale of cotton and 25 bushels of corn an acre when he moved to the

**Disking soil-improving vetch and rye in a 60 acre Texas peach orchard. Mulched into the surface, the crop residue protects the soil against erosion, adds organic matter and makes the soil more absorbent so that it can take in and absorb more rain. Clipping tests showed that the crop produced slightly more than 10 tons of green matter an acre.**

place 21 years ago. By following a rotation of cotton, winter legume, corn and soybeans, and Kobe lespedeza, he has increased the yield to more than a bale of cotton and 50 to 60 bushels of corn an acre.

A new crop rotation on sugar cane land, worked out for plantations in the St. Mary Soil Conservation District in south Louisiana by Soil Conservation Service technicians, allows the land to be in sugar cane half the time, whereas it has been customary to plant the land to cane three-fourths of the time. For example, during a twelve-year cycle, the land will be in cane six years, one year in soybeans, one in alyce clover, one in corn and soybeans, and three years in white clover and Dallis grass.

Farmer experience with sugar cane production following a period of three or more years of clover and grass indicates an increase of as much as ten tons of cane an acre. Increased cane production, together with legume seed harvest, plus beef production from pasture and soil-improving crops, coupled with the elimination of cost of seeding, tilling and harvesting a quarter of the land to cane each year, should increase the cane producer's income materially.

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## How and When to Seed Cover Crops for the Western Gulf States

METHODS of seeding vary within different parts of the region Most common methods of seeding are with a grain drill, broadcasting and row planting. Normal seeding rates per acre, seeding depths and time of planting are:

**Hairy vetch** – September 15 to November 15; 20 pounds broadcast, 15 pounds planted with grain drill, 10 to 15 pounds drilled with small grain, 8 pounds regular width rows; plant 2½ inches deep.

**Sweet clover —** (Hubam, Melilotus indica, Madrid or other biennials – September 15 to November 15 or February 15 to April 15; 15 pounds broadcast or with grain drill, 10 pounds drilled with small grain, 5 pounds regular width rows; plant ½-inch deep or less on firm seedbed.

**Austrian Winter and Singletary peas** – September 15 to November 15; 40 pounds broadcast, 30 pounds planted with grain drill, 15 pounds regular width rows; plant 2½ inches deep.

**Crimson clover** – September 15 to November 15; 20 pounds broadcast, 15 pounds planted with grain drill, 12 pounds planted with small grain; plant ½-inch to one inch deep.

**Alfalfa** – September 1 to November 1; 15 to 25 pounds drilled; plant ½-inch to ¾-inch deep.

**Alyce clover —** May 1 to July 1; 15 to 20 pounds broadcast, 10 to 15 pounds drilled; plant one inch deep.

*(Continued on page 63)*

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**Each of these bundles contains ten plants picked at random on a sandy-land farm near Rising Star, Texas. Only treatment of the soil differed between bundles. The field growing the peanuts on the extreme left has been fallowed occasionally during the last 35 years. The grass and weeds that came up in the idle years were plowed under. During the last three years the field was green manured with hairy vetch and rye. The field producing the peanuts shown at the right was never green manured.**

# What Plants Eat

## Working like complex machines to produce food, crop plants need refueling and careful maintenance.

By WILLIAM H. EYSTER, Ph.D.

EACH year I grow about 30 acres of corn on my farm near Lewisburg, Pa. Until two years ago the plants seemed to grow normally, but the ears did not grow to normal size. The harvested crop was disappointing in that too many of the ears were nubbins.

A careful study of the young plants indicated that they were hungry for phosphorus. They tended to be spindling with dark green leaves which later assumed a purplish tinge. To correct this condition, pulverized phosphate rock was applied at the rate of half a ton per acre.

The results were amazing. The phosphate rock was added to one ten acre field, while no phosphate rock was added to the other 20 acres. The ears from the phosphate-rocked field were uniformly well developed and large, while those from the fields which had not been treated were as before, poorly developed, slow to mature and mostly nubbins like those ears shown in the photograph.

Such quick results were surprising because I had been led to believe that the phosphorus thus applied would not be immediately available to corn plants. Of course, soil conditions are important and evidently, in my case, were favorable for making the phosphoric acid in the phosphate rock available at once.

### Planned Fertilizer Practice

The story of my corn crop shows how important it is that a farmer learn to know his crop plants intimately and how necessary it is that he know what nutrients they take from the soil. A crop plant is, after all, a machine for building up foods for farm animals and for man.

Just as there are different kinds of machines for doing the same work, there are different varieties of plant life which produce much the same product, although one group may be much more efficient than another. It is important, therefore, that the farmer select for planting the variety of corn, of wheat, of oats and every other farm crop which will give him the greatest returns on his particular soil and in the region in which his farm is located.

The point that I want to make here is that the farmer must select a plant type, of corn for instance, with the same care that he selects a piece of farm machinery.

### The Raw Materials

Each crop plant may be regarded as a separate factory. The power plant which supplies the energy is the sun. A crop plant may, therefore, be called a sun machine or solar machine. Like any factory, a crop plant must have certain raw materials. These materials consist of carbon dioxide, which is taken from the atmosphere by leaves, water which is taken from the soil by roots, and mineral salts which also are taken from the soil by roots.

### The Essential Plant Nutrient Elements

Until a relatively short while ago it was believed that crop plants required only the following nutrient elements: carbon, hydrogen, oxygen, phosphorus, potassium, nitrogen, sulphur, calcium, iron, and magnesium. It is upon this belief that the present fertilizer industries are based.

But with the aid of improved techniques, it has been found that other chemical elements are absolutely essential to the normal growth and development of crop plants. Among the more recently discovered essential elements are copper, boron, manganese and zinc, which are required in such small amounts that they are commonly called trace elements. In addition to the elements already mentioned, which are needed by all plants, certain others like sodium, chlorine, silicon, and iodine, are needed by some but not necessarily by all. A supply of these elements in forms available for plant use becomes, therefore, a very important consideration.

For convenience, the essential elements may be grouped into seven major elements: carbon, hydrogen, oxygen, phosphorus, potassium, nitrogen, and calcium; three minor elements: sulphur, iron, and magnesium; and an indefinite number of trace elements.

### The Major Plant Nutrient Elements

Although plants are made up

largely (95 per cent) of carbon, hydrogen, and oxygen, some of the elements which occur only in relatively small amounts are just as essential to their growth and development as those which compose the greater part of the plant tissue.

In the case of boron, for instance, only a few parts per million are required for normal growth and development of crop plants. But if this trace is not present in the soil such "diseases" develop as heart rot of sugar beet and mangold, canker and internal black spot of garden beet, brown heart of turnip, browning of cauliflower, cracked stem of celery, top sickness of tobacco, internal cork of apples, and brown-spotting of apricots.

To prevent such deficiency diseases, fertilizers must include the minor elements in addition to the usual N. P. and K trio. Ground rock fertilizers have these minor elements, but most chemical fertilizers do not.

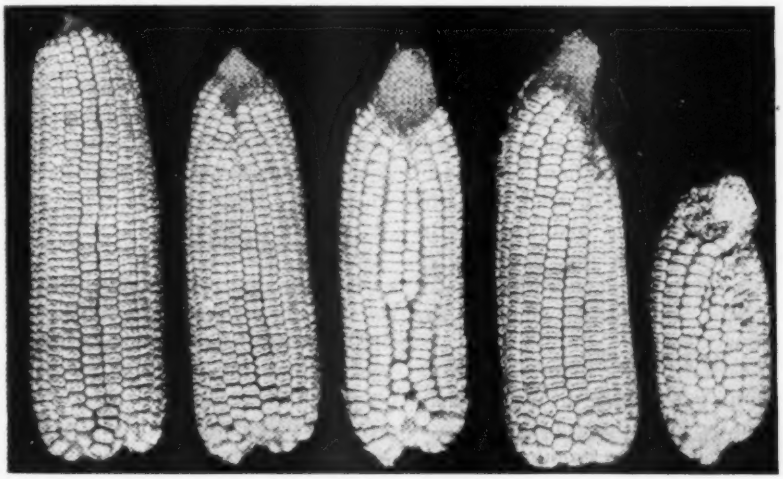
The demands of the major plant nutrients made upon the soil by the more common crops are indicated in this table.

Before discussing the fertilizer practice that should be adopted in replacing these nutrients, we can profitably give consideration to the time in the life of the plant when the demands are actually made.

**Number of Pounds of Nitrogen, Phosphoric Acid, and Potash Withdrawn Per Acre by an Average Crop.**

| Name of Crop | N* | P* | K* |
|---|---|---|---|
| Barley | 78 | 35 | 62 |
| Buckwheat | 63 | 40 | 17 |
| Cabbage | 213 | 125 | 514 |
| Cauliflower | 202 | 76 | 265 |
| Cattle turnips | 187 | 74 | 426 |
| Carrots | 166 | 65 | 190 |
| Clover, green | 171 | 46 | 154 |
| Clover, scarlet | 95 | 17 | 57 |
| Cow pea | 254 | 64 | 169 |
| Corn | 146 | 69 | 174 |
| Corn fodder | 122 | 66 | 236 |
| Cotton | 110 | 32 | 35 |
| Cucumbers | 142 | 94 | 193 |
| Esparsette | 239 | 36 | 103 |
| Hops | 200 | 54 | 127 |
| Hemp | | 34 | 54 |
| Lettuce | 41 | 17 | 72 |
| Lucern | 289 | 65 | 181 |
| Lupine, green | 219 | 46 | 63 |
| Lupine, yellow | 80 | 37 | 155 |
| Meadow hay | 166 | 53 | 201 |
| Oats | 89 | 35 | 96 |
| Onions | 96 | 49 | 96 |
| Peas | 153 | 39 | 69 |
| Poppy | 87 | 30 | 87 |
| Potatoes | 119 | 55 | 192 |
| Rape | 154 | 79 | 124 |
| Rice | 39 | 24 | 45 |
| Rye | 87 | 44 | 76 |
| Seradella | 128 | 57 | 196 |
| Soja bean | 297 | 62 | 87 |
| Sugar cane | 518 | 37 | 107 |
| Sorghum | 446 | 90 | 561 |
| Sugar beet | 95 | 44 | 200 |
| Tobacco | 127 | 32 | 148 |
| Vetch | 149 | 35 | 113 |
| Wheat | 111 | 45 | 58 |

*(N), Nitrogen; (P), Phosphoric Acid; (K), Potash



**Poorly formed ears of corn often result from a poor balance of major or minor plant nutrients. Phosphate rock and other rock fertilizers can correct these deficiencies.**

### When Soil Nutrients are Used

The early activities in the growth process of crop plants are concerned primarily with photosynthesis, *i.e.* the building up of carbohydrates (sugars, starches, celluloses, etc.) from water and carbon dioxide, a process in which minerals from the soil are not used. In the tomato, for example, only three per cent of the nutrients taken from the soil are used during the first month after the plants are set out in the field. During the second month 27 per cent of the nutrients are used, while the remaining 70 per cent of the soil nutrients are absorbed after the plants have been in the field 60 days. A ten-ton-per-acre crop of tomatoes removes from each acre of soil about 100 pounds of nitrogen, 35 pounds of phosphoric acid, and 200 pounds of potash. See drawing on page 45.

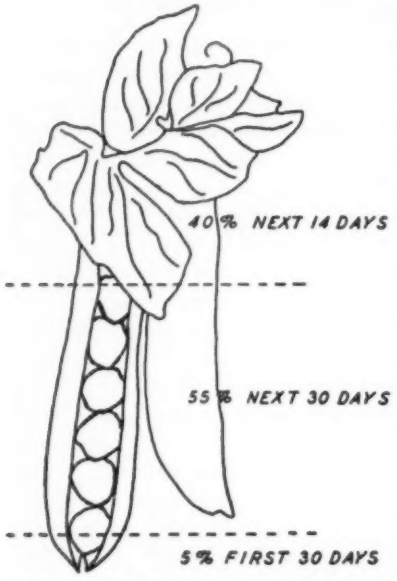
Similar results have been found in the carrot with respect to the absorption of potash from the soil. Although the carrot is a heavy user of potash, it takes only four per cent of its needs from the soil during the first 70 days of its growth cycle. During the following 30 days, it takes from the soil 27 per cent of its potash requirements, while during the last month of its growth it takes from the soil 69 per cent of the potash it uses to complete its growth. See drawing on page 44.

The use of minerals taken from the soil by tomato and carrot is doubtless typical of most other crop plants. It should be noted in particular that in the early stages of growth, only a small per cent of the mineral requirements are taken from the soil. It is only after 60 to 100 days that the crop plants begin feeding heavily on the soil nutrients.

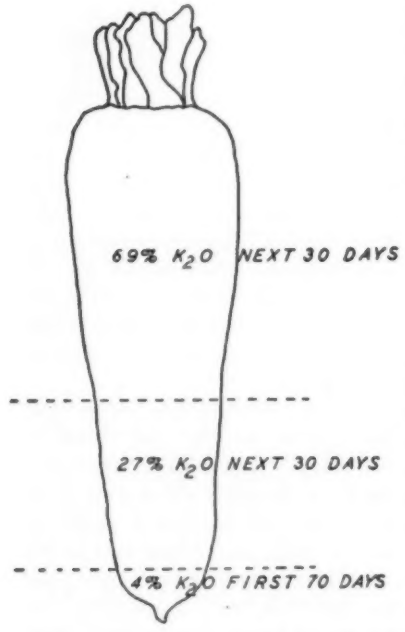
# What Plants Eat

*Continued*

This is easy to understand, as a plant must first build up carbohydrates by photosynthesis before it can use the minerals. The utilization of minerals in building proteins and other complex organic compounds in the plant body is referred to as *biosynthesis.*




**Relative rate of absorption of plant food by garden peas.**




**Relative rate of absorption of potash by carrots.**

This delay in the use of soil nutrients by plants is one very logical objection to the application of highly soluble fertilizers to supply the necessary nitrogen, phosphorus, and potassium. By the time the crop plants actually need these nutrient elements, a large part of them may have been leached out of the soil in the drainage water. Such waste can be prevented by supplying the phosphoric acid in the form of finely pulverized phosphate rock and the potash as finely ground granite dust or greensand or glauconite. The soil acids, including those given off by the roots of the growing crop plants, will convert these pulverized rock particles into salts which can be used by the crop plants. By the time the crop plants are ready for the phosphoric acid and potash, a sufficient amount to meet their needs will have been made available to the roots of the crop plants. Since the pulverized rocks are insoluble in water they cannot be leached out of the soil and carried away in the drainage water.

Leaching can be reduced to a minimum by increasing the organic matter in the soil. Humus has the capacity of holding large amounts of water in the soil and making it available to crop plants when other conditions for growth are most favorable during the middle and end of the growing season. Humus also combines and holds in reserve the soil nutrients.

### Planned Fertilizer Practice

A farmer must give particular attention to his soils in relation to crop production. In growing tomatoes, for instance, the farmer should first determine the size of the crop that is necessary to make the undertaking profitable. Let us assume that a yield of 10 tons per acre would be satisfactory. To grow such a crop, the tomato plants would take from each acre 100 pounds of nitrogen, 35 pounds of phosphoric acid, and 200 pounds of potash.

It is apparent that especial attention must be given to organic matter and potash. The organic matter should be added in the fall so that it will be well composted by the time the tomato plants are set out. Also the soil should be given a heavy application of a natural potash rock, such as granite dust or greensand. From two to four tons per acre should be sufficient to meet the potash needs of crop plants for from five to ten years.

In addition to supplying the necessary potash, the pulverized rocks also contain the exceedingly important trace elements as well as some of the minor elements. The farmer must be observant. He must examine his growing plants critically throughout the growing season. He must pay attention to size and color of the plants, type of growth, susceptibility to diseases and insects, time of maturity, color and size of fruits, and texture and flavor of the fruits.

### Symptoms of soil deficiencies

Retarded growth with lack of green color in the stems and leaves indicates a nitrogen deficiency. Other symptoms of this deficiency are poor root-top balance, yellowing buds which are shed without opening, small pale-yellow unripe fruits, and small, intensely-colored ripe fruits. These conditions add up to poor yield.

Potassium deficiency is revealed by slow growth, leaves crinkled when young and grayish green with yellow margins when fully expanded. The yellowing extends over the entire leaf, causing bronzing of the tissue, followed by the development of large, light-colored spots between the larger veins. The leaves finally turn brown and die. Potash deficiency is also reflected in the fruit which is abnormal in shape, poor in texture, and inferior in quality.

Phosphorus deficiency is shown by the reddish-purple color of the leaves, especially on the under-surface. The stems are slender and fibrous and the leaves are small. The fruits are late in setting and remain small.

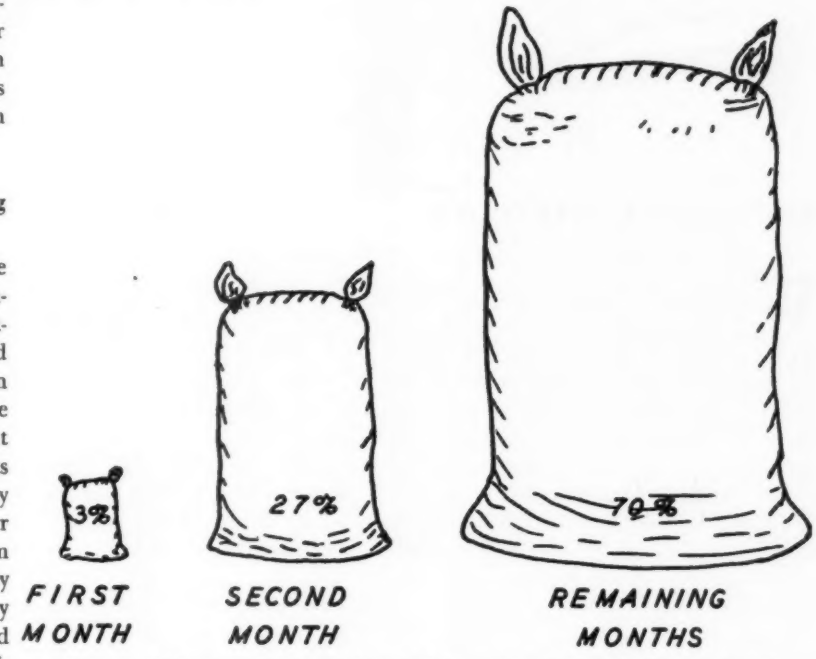
Tomato plants express characteristic symptoms also for deficiencies in calcium, sulphur, magnesium, boron, iron, manganese, and zinc. These deficiencies need not be discussed here because they are nothing to worry about, provided the soil has been properly prepared with liberal amounts of organic matter and the pulverized rocks which contain all the soil nutrients except nitrogen.

What has been said about the tomato is equally true of all other crop plants. The tomato has been used in this discussion because it has been studied more extensively than almost any other crop plant.

### Keep Your Crop Plants Running like Machines

Plants are machines but they are much more complex than any man-made machine. It is just as important, however, to keep them in good running order as it is to keep farm motors running. Very little can be done about weather conditions, but much can be done to keep the plants in good running order by properly conditioning the soil. Since 95 per cent of a plant's bulk comes from carbon dioxide and water, it is highly important to conserve water in every way possible — contour stripping and plowing, and maintaining a sufficient amount of organic matter in the soil.

Crop plants can make only limited growth without soil nutrients. It is *not* practical for a farmer to detect deficiencies of individual essential elements and add them much as he might replace a bolt in a tractor. It is far simpler for him to make sure that all the essential elements are present in sufficient amounts at all times. This assurance can be had by returning to the soil always a little more organic matter than is taken from it, and by regularly remineralizing the soil by applying finely pulverized rocks containing all the major, minor, and trace elements which do not occur in the organic materials returned to the soil.




**Rate at which tomatoes absorb plant food from the soil after being transplanted.**

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### Avoid Fall Plowing and Cut Soil Erosion Losses

Your losses from soil erosion should be much smaller this winter if you leave your land unplowed until spring. Fall plowing is especially bad on heavy, flat, depressional soils that stay wet in the spring.

The worst thing about fall plowing is that it exposes the soil for so long. The result is likely to be heavy loss from erosion. A surprising amount of erosion occurs on almost level land too.

Illinois soil experts measured losses of good corn-belt soil with a four per cent slope when all trash was removed from corn stubble land. They applied one and three-fourths inches of rain artificially each hour.

In the test one and one-half tons of soil were lost per acre in only one hour.

In comparison, only one-fourth ton of soil was lost in this same test when the cornstalks were broken down across the slope.

Cover crops are best for keeping soil in place during heavy winter rains. Last winter when 26 inches of rain fell during January and February at Dixon Springs Experiment Station in Illinois, soil losses were only two-fifths of a ton per acre on land planted to lespedeza.

However, 39 tons an acre were lost on land planted to wheat on the contour on a nine per cent slope, with cornstalks disked in before seeding. That's about 100 times as much as on the lespedeza area.

And there are still other drawbacks to fall plowing: If the soil dries out in late fall or early spring, there is probably more damage from wind erosion than we realize. And the argument of saving time in the spring by plowing in the fall isn't nearly so true now as in the days of horses.

# Thoughts on Pruning

From THE ORGANIC FARMER, November, 1950

By GUSTAV L. WITTROCK

WHEN one thinks of the millions of neglected trees and shrubs that make up the flora of our natural forests and waysides he may well ask the question: "Why prune a plant?" These plants survive, they bear flowers and fruits; they have apparently done this for eons, long before man came to this earth and thought of pruning, so why prune?

We may well answer our question with these words: "We prune to civilize and tame plants and to bring them under control to our advantage, to aid the plants and shrubs in producing better fruit and flowers, and finally to give longer life to the plants."

### Nature Prunes its Native Trees

Nature's method of pruning may be considered as haphazard, inefficient, reckless or destructive, but it is a natural process that can be observed readily by simply walking through a virgin or neglected forest. In fact, nature is the best teacher of the basic principles of pruning, if we but take time to observe.

Branches that are weak die, crossing or rubbing branches kill each other, branches that develop at too wide an angle from the trunk are weak and have little chance to survive, particularly when loaded with fruit. Dead limbs and branches are not "sawed off" by nature, but the good old friend, the wind, acts as the pruner and snaps off all the dead and weak material. Pruning by the wind is a slow process and certainly must be classed as haphazard since the branches have to be fairly well rotted before the wind can snap them off unless the wind is a high gale, then green branches go too. Even the destructive gale reveals basic principles of pruning.

The trees within the forest group bear their dead branches for long periods, awaiting the wind to prune them off. While these dead branches are still on the trees and shrubs, a second factor of destruction enters — the scourge of fungi and insects. Dead branches are the pastures for parasitic and saprophitic (living on dead organic matter) fungi, since the limbs no longer have their protective bark. And many of these parasites, followed by boring insects, will pass through the decay and enter healthy wood. Thus a forest tree is rarely in perfect health, handicapped as it is by dead branches, fungi, insects and crowding.

Were we to give nature a hand in the forests we would certainly increase the life cycle of the selected forest trees. This type of care is the function of forestry — the study of the protection, selection and preservation of our natural forests. We in America have been rather thoughtless about care of forest trees because we are still rich in natural resources.

### What Is Meant By Pruning?

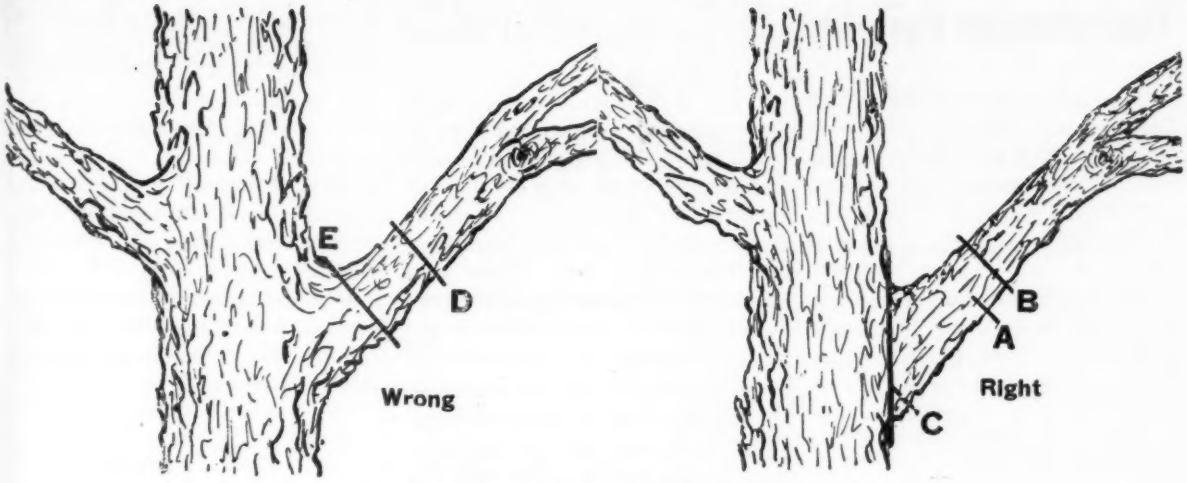
Cutting out dead wood is only a phase of pruning. The purpose of pruning is to remove the tree's excess wood, its handicaps, and alleviate the struggle of part with part, thus increasing the chance of a plant to gain better growth, greater strength and the maximum production of flowers and fruits. It is also in part a process to shape a plant into a definite form. There are usually more branches on a plant, on its sides or in its crown, than can possibly survive; a large proportion will die through the struggle for existence.

Nature eliminates and selects by a slow process. Controlled pruning selects quickly and may be defined essentially as a thinning process.

### Does Pruning Injure Plants?

Does cutting off limbs or branches injure the tree or plant? What is the physiological response of a plant to pruning? Pruning is not a devitalizing process. It is harmful only when the wounds made by pruning do not heal quickly and disease sets in.

The notion that pruning is harmful arises from the false analogy with animals that suffer shock when parts are removed. A tree too is shocked




**A wrong pruning cut may cost the life of the tree.**

by the removal of parts, but as an organism it is entirely different from an animal and in no sense can it be compared with animals in reference to this type of treatment.

However, the act of pruning always causes wounds. Unfortunately, it is a necessary evil. Some scoff at the seriousness of a wound if it is less than one inch in diameter, but the fact is that whether a wound is one foot across or 1/100 of an inch, it becomes a sore spot on the plant, and until thoroughly healed it is constantly subjected to attack by fungi.

The work of a pruner must be conducted with the minimum amount of bark or skin injury. He must not climb trees with spiked or hob-nailed shoes. He should wear rubber soles, tennis shoes preferably, since the rubber soles will not slip on wet bark or injure it. He must not slide ladders carelessly on branches, but should place them carefully. If he uses rope on the tree he should be sure that his anchor rope is securely tied on healthy bark and that it will not slide too seriously.

No tree should be pruned until the operator knows why he is pruning. He should diagnose his tree, note the dead and injured limbs first, and then decide what additional healthy branches should be removed.

Not more than two or three large, healthy branches should be removed in one season, especially from large trees. Observation shows that our greatest fault in pruning is not that we prune too much, but that we prune too much at one time. Inordinate pruning at one time not only makes many unsightly scars and exposes too many areas to fungi, but it induces a great deal of suckers to develop.

### How to Cut a Limb

There is only one way to cut a branch from a tree correctly, and that is to cut it the safest and surest way for the remaining scar to heal. One is not interested in the cut limb, but he is concerned about the tree from which it is cut.

The proper cut is not the easiest one. The shortest cut through a limb is at right angles to its diameter,

**Peach tree at planting time.**

**Same tree pruned.**

# Thoughts on Pruning

*Continued*

as illustrated in the drawing at "D." This cut will leave a stump even though one may start the cut at the crotch of the trunk at "E." A stump at the base of a cut branch is a severe hindrance to the healing of the wound.

The proper cut of a limb should be parallel to the trunk. That rule applies to all trees, whether shade, ornamental, timber or fruit trees. A parallel cut will be the largest one in terms of diameter, but it will be the fastest cut to heal.

If the limb is more than two inches thick, three cuts should be made. The first is the under cut, made from six inches to one foot from the trunk as shown in the illustration at "A." Then the upper cut is made at "B" until the limb snaps off by its own weight.

The purpose of these two preliminary cuts is to prevent the tearing of the bark that would occur if the final, parallel cut were to be made while the heavy limb were still in place. Tearing the bark of the trunk is equally as serious as leaving a stump.

After the weight of the limb has been removed by the preliminary cutting, the final cut at "C" is made. The careful pruner may tie up the stump to prevent it from falling and tearing the bark when the final cut is made.

### Types of Green Branches Classed as Weak

In the general form of a tree, many branches develop that are destined to die within a few years because of their location, their mode of attachment to other branches, or their relation to the general form of the tree. These branches are the ones selected by the pruner when he wishes to thin it out, particularly in the case of fruit trees. These weak branches are sucker growth, horizontal forks of equal thickness and under branches of a main branch.

Sucker branches usually arise within the tree from adventitious buds. They grow very fast the first year, and as they become stiffer they rub other branches, bruising them as they poke through to the top of the tree seeking light, thus opening the bark of the older limbs and exposing them to fungi.

The forked branch is very weak, and it is one type of branching the pruner must guard against while standing in a tree. If not too large, it is always best to remove one of the limbs.

The third type of weak limb is the under-branch. A sucker in origin, it arises from the underside of an older limb and should be carefully removed.

### Pruning by Disbudding

The wise pruner does not wait for limbs to grow out and then saw them off annually; he prunes by pinching out the terminal buds. Disbudding is a very simple operation and requires little exertion. A robust shoot can be checked at an early age by pinching out its terminal growing point. Thus, growth in length is checked without the removal of foliage, while the growth vigor of the shoot is diverted to other buds and shoots develop where a more active extension is required Disbudding is much practiced with berry and fruit trees. It is a practical method of preventing growth where it is not wanted. Rubbing off a bud in May saves cutting off a branch in December.

One may class disbudding as weekly inspection of an orchard throughout the season, and particularly as summer pruning.

### Time of Pruning

Most people prune in the spring. Without question, it is the worst time to prune. The sap, valuable food, may ooze out of the wound and become soured and spoiled by bacteria. The decay of sap causes rot around the exposed wound.

Why not prune in the summer months? During summer, growth is well established and pruning will not bring on excess sucker growth. Cutting back in summer induces fruit buds to develop in greater proportion to wood buds.

If weak, cut out extra green branches of fruit trees in late June or early July, after the flowers have set and small fruit is already visible. Reducing the amount of fruit gives the remaining fruit a better chance to grow on strong branches. All the excessive potential growth left after pruning the tree will be diverted from making suckers, and will be used to increase the size of the fruit and even accentuate its taste.

"Facts About Pruning" consists of excerpts from *The Pruning Book*, published by Rodale Press ($3.00).

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### Mark Best Plants In Berry Field

Growers who plan to dig strawberry plants from their own fields next spring for new plantings can well take time to make a close examination of the fields before winter.

Areas of the established field where plant growth is most vigorous and healthy should be marked with stakes and plants dug from these areas next spring. Marking makes it easy to reduce diseases such as Western Yellows virus and Leaf Curl virus and perhaps others. Unless plants are marked while they are growing actively, next spring at digging time the weak plants will not be identified easily.

Growers who have followed this system of marking and digging only the best plants have improved their fields over the years and the result has been better yields.

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## A Straw Worth Grabbing

(*Continued from page 15*)

been developed in the past few years, broomcorn types may be generally classified as: the Standard, Dwarf, and Acme (a dwarf standard). The Standard variety, which is raised most widely on a commercial scale, grows to a height of 10 to 15 feet, produces a heavy brush 18 to 28 inches long. It is used to make medium to heavy carpet, warehouse, and stable brooms.

Dwarf broomcorn grows from four to six feet high, has a large amount of foliage, and produces a fine brush ten to 18 inches or more in length. Its straws are weaker, less elastic than those of the Standard type, and are not so good for making heavy brooms. It is used chiefly for hearth and whisk brooms, the grade best suited for making clothes brooms bringing the highest market prices. The straw should be fine, straight, tough, elastic, of a uniform green color without red tints, and from ten to twelve inches long.

Although it was once believed that the woody broomcorn stover, which is left over after the brush is harvested, was valueless or actually injurious for feeding, about ten years ago Illinois experiments proved that the stalks make fairly good silage. It is ensiled as soon as the brush is harvested, and 100 pounds of molasses are added per ton. Broomcorn silage made without molasses kept poorly. The silage was somewhat less palatable to dairy cows than ordinary silage, but as soon as they became used to it, they ate it readily, and produced only slightly less milk than when fed corn silage.

Broomcorn is harvested before the seed has fully matured, and the seed is removed from the brush before it is thoroughly dry. This seed has considerable feeding value. Ground-up broomcorn seed gave better results in an Oklahoma pig-fattening test when it made up one-fourth rather than one-half of the ration.


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## A Straw Worth Grabbing

*Continued*

Thus fed, it was worth 60 per cent as much as corn The whole seed is fed to poultry.

The seed weighs 44 pounds per bushel for the large, and 50 pounds a bushel for the small varieties. The plants are slow-growing in the spring, so most farmers plant about two weeks after corn-planting time, using a common corn planter with cane seed holes, at the rate of three to five pounds per acre The rows are about the same as corn or sorghum, the seed dropped from four to six inches in drill. A uniform stand will assure a more uniform maturing brush.

More care in securing good seed is necessary for broomcorn than with most crops, because much of the seed marketed by the threshers is very poor. Much of it is produced in humid regions and is not adapted to the drier regions where most broomcorn is grown. Each grower should produce his own seed, if possible, selecting it from plants that ripen uniformly. Otherwise get it from a reputable dealer in your own locality.

Prepare seedbeds as for corn or grain sorghum. As the plants start off very slowly in cool weather, frequent shallow cultivation is necessary to keep weeds and grass down. A harrow or drag may be used when broomcorn is planted in lister furrows. Otherwise it is cultivated the same as other row crops.

Broomcorn brush should be harvested while the plant is in bloom, or when the anthers are falling from the head, to command the highest market price. If seed is allowed to ripen the brush becomes brittle and loses value.

The brush of the dwarf type is usually "jerked" or pulled by hand from the standing stalks. It is placed in convenient piles on the ground until it can be hauled to the curing shed. The seed is removed from the straw by holding the heads between two revolving cylinders similar to those of a regular grain thresher. After curing for three or four weeks the straw is graded according to length and fineness of brush, pressed into bales weighing between 300 and 400 pounds, and is ready for market.

The greater height of the Standard type makes it necessary to bend the heads over before harvesting. This is done when the seed is in the dough stage. The farmer walks backward between the two rows, bending the heads over first from one row and then from the other in such a way as to form an overhead "table" from four to six feet above the ground. The heads are then left in the field until cured, which requires a day or so, depending on the weather. (Shed curing is considered safer, as heavy dew or rain will damage the quality and lower the grade.) The farmhand then passes down between the two tables, walking backward, cutting off the heads with a sharp knife, six to eight inches below their bases.

The United States average yields are 256 pounds of straw per acre, but Illinois' average yield is 492 pounds, and individual growers sometimes double this production. A total of 27 hours is required to plant, cultivate, harvest, and market an acre of broomcorn: seven hours for preharvest work, 20 hours for harvesting and marketing.

Oklahoma is now the nation's largest producer of broomcorn, having harvested almost half (11,000 tons) of this year's depleted crop.

## Customized Blueberries

*Continued from page 37*

thorn in the side of the farm's former owner who viewed it with disgust, turning to his 200 other acres for a dairying profit.

A nephew visiting from England saw possibilities. "Looks like the kind of soil our blueberries grow in," he said. When he returned home he gathered together the nine best varieties he could find in England and shipped them to his uncle. The plants took to the moist muck like beetles to beans chemically fertilized. Unaided, they thrived and spread.

The bad winter of 1933 froze out most of the bushes. Two years later the Boreaus took over the farm. Although dairying became their main task, Mrs. Boreau developed a motherly interest in those remaining bushes. In the Fall she carefully gathered the finest berries and "although it hurt me to do it," she scattered them in denuded areas. Nature did the rest.

After another bad winter 4 years ago, she repeated the process. The growth became so lush that in 1948 over 8000 quarts were taken from the patch and several thousand more were awaiting picking when the frost got them. Picking begins in July. The Big Drought of '49 reduced the yield considerably last year, but there still were plenty of berries.

Mr. Boreau has made it as easy as possible for the blueberry pickers. It

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used to be necessary to wade, sometimes hip deep in mud, to reach the higher-lying bush. Each year Mr. Boreau has filled in more roadway, so that now it is possible to drive almost into the patch. Planks laid on the remaining path keep the feet reasonably dry. Rubbers, of course, are in order.

Flagged trees and easy directions (for those who will listen) are landmarks, and a shout from anyone really lost will bring Mrs. Boreau — who spends much of her time picking — to the rescue. Each bush is an old friend to this kindly woman. "I believe I know every one in here," she will tell you.

Mr. Boreau says that the government on several occasions has taken borings of the plot. Muck over peat, the report is, and apparently no one has found the bottom of the peat. This combination of peat, muck, moisture, and the protection of the surrounding trees makes a perfect setting for the blueberries, and doubtless explains their size and quantity.

"Everyone remarks that there are no bugs on them, and asks if we spray them," Mr. Boreau says. "We don't do anything to them, although Michigan growers I have talked to have been almost wiped out by insect damage in spite of heavy spraying. I believe our berries are free of disease and bugs because conditions are right for them. We also have plenty of birds and natural enemies of the insects which control them for us."

Even more pleasant for the picker is the freedom from snakes — especially rattlers — which are prevalent in many blueberry bogs. Mrs. Boreau has the answer for that one, which she gave to a swearing Irishman. "You know Pat?" she asked. "St. Pat cleaned the snakes out of Ireland, didn't he? Well, I just wrote him a letter and he did the same thing for us. You won't find a snake in here."

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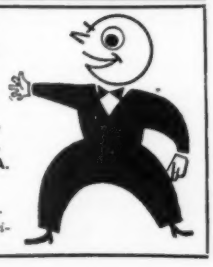

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*Livestock*

# The Sterility Problem

NOBODY knows how much meat and milk is lost each year through infertility in cattle, *The Lancet* observed recently, but all agree that the loss is very large indeed. The term "infertility" means everything from outright sterility to mere delay in getting cows or heifers with calf.

The serious economic problem facing the dairy industry, makes it necessary first to find out the extent of the trouble and then learn ways of overcoming it.

It is often said, the article continues, that the cows producing most milk are most prone to reproductive difficulties. The conclusion is drawn that breeding for high milk production is to blame for the apparent decline in fertility in recent years. Figures proving this contention are lacking. But it must be remembered that both milk-giving and reproductive functions are dependent on the pituitary gland. It may be that breeding for high milk production results in the selection of a pituitary which secretes less of the factors controlling reproduction and more of the hormones important for lactation. Further work on these glandular mechanisms might well increase our understanding of the relation between high milk production and fertility.

It has been suggested, also, that a diet with an excess of calcium in relation to phosphorus – which could arise from the excessive application of lime – may interfere with breeding efficiency. One experimenter reported that the conception rate rose from 30 to 70 per cent in a herd of shorthorns when a high calcium/phosphorus ratio in the feed was corrected.

A noteworthy example of reproductive failure in grazing animals, following the introduction of advanced methods of pasture management, was provided by the sheep of Western Australia. These sheep ceased to breed normally when they were put on pastures rich in deep-rooted clover. The cause proved to be a substance in the clover which affected the animals' heat periods.

Long years of selective breeding for plumpness of beef cattle, veterinarians also warn, may be a cause of sterility. Breeding for tender steaks has produced cows with slowed down thyroid glands. Lowered fertility is the result. Treatment with thyroid preparations and reducing diets to rid cows of excessive fat both have had a beneficial effect on calving performance.

— G. M.

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TELLS how 750 "worthless acres" were changed into rich farm land by use of the organic method. Filled with graphic descriptions, illustrations, recommendations for making pastures, reclamation of waste or derelict lands, and increasing the water-holding capacity and productivity of the soil. The value of mixed farming and reforestation, the importance of the earthworm, and the mechanization of the compost method are all clearly explained.

Friend Sykes' account begins when what was regarded as one of the best herds in England proved, upon government inspection, to be 66% diseased—the result of deficiencies in the food plants. The herd was dispersed and the valuable farm land sold. Friend Sykes then purchased 750 acres of land on the Salisbury Plain which farmers round about considered practically worthless. He subsoiled it and fertilized with natural manures exclusively. Pasture and crop plants were grown which were rich in minerals and other nutrient materials.

As a result, the cattle and horses were maintained in health and vigor that had been hitherto unknown, and the land is now visited by outstanding agriculturists as one of the most interesting farms in England. 416 pages, 40 photos. **$4.50**

# Who Reads The Organic Farmer?

*The Organic Farmer* entered its second year of publication with the August 1950 issue. Just after the last correction in the type of that 13th issue was made, we decided to take a look at you, our readers, and to find out just what progress you had made with the organic method and how well we were helping you.

In two days we printed 2000 questionnaires and mailed them to a sampling of readers from every state. So far 295 have been returned, and they are still coming in every day.

We were pleased to see that 228 of those who answered the questionnaire owned or rented farms, and that 184 of that number operated them organically. Seventy per cent of the organic farmers said they were satisfied with the results they have been getting (many were enthusiastic), 10 per cent were not satisfied and 20 per cent had not been practicing it long enough to tell.

One man who farms organically "to the best of my ability" erupted as follows when asked if he was satisfied with the organic method: "A satisfied farmer never gets anywhere. He must be constantly on the alert for better methods." We agree, and it was a search for better methods that prompted us to ask what your farming problems were and what phases and techniques we should report on in the magazine.

The answers to that question were revealing.

Although most readers wanted to hear more about their own type of farming, two subjects were mentioned more than any other – rotary tillage and grass. At least a hundred people expressed a desire to own a rototiller, planning to use it for incorporating organic matter in the soil and as a once-over tillage tool.

The tremendous interest in legumes and grasses was to be expected. Everyone who is or claims to be an expert on agriculture has, especially during the last few years, sounded off on the importance of grass to the farmer and the advisability of turning more to a grassland economy.

Acting quickly on this more than gentle hint, we have speeded work on a series of articles on green manure and cover crops. To be written in large part by men of the Soil Conservation Service, this series will consist of six articles each covering the grasses and legumes adapted to a different section of the country. The first article of the series, covering the western Gulf region, starts on page 39 of this issue.

We are indebted to those answering the questionnaire for the good ideas for articles that they gave us, many of which will be made use of in future issues. Said one reader, "A crop technique that I want to see treated is the one where you just plant the seeds (with the least work) and then just sit back and let them grow." Another wanted us to write about what to feed a cow to make her breed regularly.

A great many wanted to read more about the experiences of other organic farmers. We have always tried to print a good number of articles about individual organic farmers, telling what problems they ran up against and how they solved them. But we could do a better job if we had more reports from our readers. If you think your experience could be helpful to other organic farmers, why not share it with them? We will gladly act as the middle man.

The regional slant of articles drew the biggest share of complaints. "Give us more about New England and less about the West," said someone from Brookfield, Mass. And a farmer from Oregon asked indignantly, "Don't you realize that you have readers out West, too?" But the best suggestion came from a man whose location we have been unable to trace. "Give us ideas that can be applied by anyone anywhere," he said. We'll try.

### Crack Down on Aerial Dusting of Organic Phosphates

Oregon's State Agriculture Director Sverre N. Omdahl has ordered an immediate halt of aerial crop dusting with organic phosphates. He halted such dusting pending an investigation, emphasizing that the dust may create a health hazard.

Omdahl's action should be an example for many users of the new powerful insecticides who dust first and consider health hazards afterward.

### Sound Advice from a Leading Wheat Raiser

Congratulations to Thomas D. Campbell, the nation's wheat king and farmer of many thousands of acres in Montana and New Mexico.

Campbell, whose large holdings might lead one to mark him as a member of the "why-conserve, there's-more-where-this-came-from" school of thought, recently spoke up for wider use of soil conserving methods.

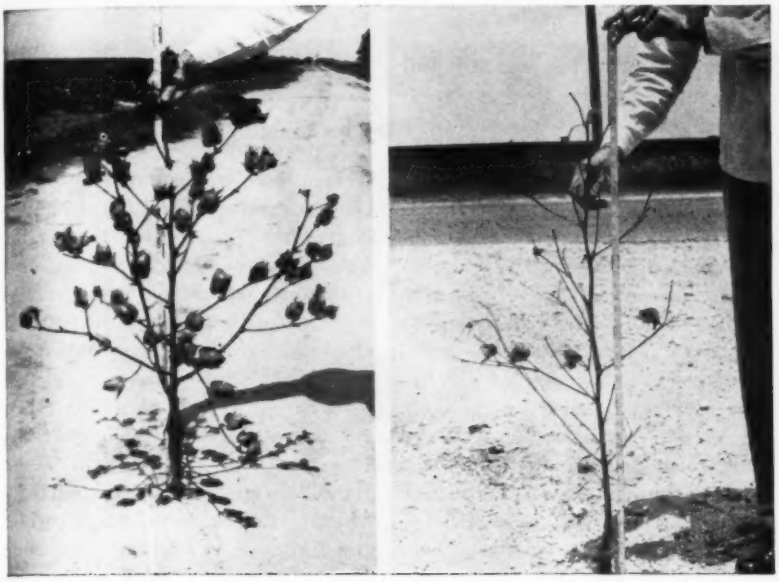
"I feel," he declared, "that I, as a landowner, have no right to destroy the soil and should *be made to* conserve it for society and posterity. Farmers who don't practice conservation methods are foolish and hurt themselves as much as society."

### More Bug Catchers Needed

The Department of Agriculture has just reported that cotton is taking the heaviest beating in many

Bug Catcher

No Bug Catcher



years from insects. A monthly insect pest survey showed that boll weevils, cotton leafworms, bollworms and pink bollworms were running wild over a region, the center of which is Texas and Oklahoma. In one Texas county losses from the pink bollworm ran as high as 50 per cent.

The photograph shows the efficiency of the Nisbet bug catcher in keeping cotton clean of insects — without the use of poisons. The bug catcher is a machine that blows insects off cotton and other row crops and catches them in a cloth bag.

### Chemists Shoot Gas Underground to Kill Nematodes

A new danger to health in the form of powerful nematocides is revealed by this item from the Tulsa Oklahoma *Tribune*:

"New boons to farmers from science were forecast today by Dr. B. C. Chitwood of the Catholic University of America.

"One is underground gas attacks to wipe out nematodes, or eelworms, tiny creatures that cause mysterious "soil sickness." The gases come from petroleum chemicals applied to the ground in liquid form.

"They wipe out nematodes by the millions. Farmers whose land has been treated this way found that "they did not know in the past what normal plants looked like."

"Other weapons may come later, Dr. Chitwood said. Plants may be fed materials poisonous to nematodes, but not to man. Plants may be given nutrients to replace those stolen by the nematodes..

This matter of using poisons powerful enough to kill nematodes but not the people who eat them is one more example — and a clear one — of how many harmful chemicals the consumer is being forced to stomach. The fellows who devise these nematocides don't realize that the consumer who is going to eat those faintly poisoned plants also eats bread that is chemically preserved and meats that are embalmed. (Hot dogs, for example, contain sodium propionate, a preservative that may not have ever killed anyone, but that certainly never did anyone any good.) The cumulative effect of these toxins is a great deal more serious than their effect when considered singly.

The nematode problem, and many others now being solved by the use of harmful chemicals, can at least partially be solved by less drastic and more natural methods.

Sir Albert Howard found that the consistent use of compost eliminated nematode attacks.



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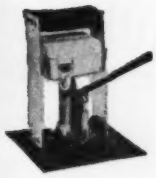

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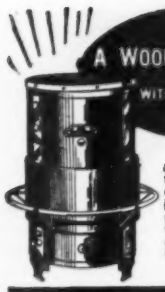

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***by J. I. Rodale***

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**ORGANIC FARMER, Box 11-F, Emmaus, Pa.**


# With the Editor

(*Continued from page 9*)

quality is that the soil which is full of organic matter is more open. It absorbs practically all the rain. The crops have more water at their disposal. With more water they grow better and are healthier. This is seen so graphically on farms that are run by the organic method that if farmers can be taken to see examples of it in rainy weather it would not take them long to make up their mind to change over to the organic method. On my farm there are certain shallow spots where heavy rains used to stand in ponds for days, showing how hard the land was, but today the most driving rains are absorbed immediately into the soil. But on neighboring lands in such weather you can see the formation of ponds in such cases. Do ponds form on your land after a rain? If so, a good subsoiling might help as well as a change over to the organic method. In our case the rains were absorbed by the application of the organic method only, before we started the practice of subsoiling.

Here is another item of saving. Mr. John Moyer of Bally, Penna., has found that after a few years of not using chemical fertilizers he was able to use his own potatoes as seed whereas before he always had to purchase his seed potatoes at substantial cost. This is a terrific item on his ledger of annual costs and income.

I would like to close my argument with a little example of the way a chemical farmer is kept down by being punished with a hardened soil. In our section this fall it had not rained for quite a while. It was time to plow for wheat and the farmers were looking despairingly towards the heavens. After awhile the rain came. A few days later came another rain and we began to plow, but I did not notice any of the neighboring farmers plowing yet. When I inquired I found that the rain had been too short and too hard. Their land was so hard that the rain had washed off because it was too driving. What they wanted, said one of these farmers, was a more gentle rain. We do not have to be so particular.

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*Eleanor Gilman*

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Here, Dr. Dale Sieling, head agronomist, demonstrates what happens in the soil. To one sample of iron chloride solution at left, he has added dissolved phosphate. And the mixture has immediately turned white with a precipitate of iron phosphate useless to a plant. To the other sample of iron chloride, he first added citric acid—one of the organic acids formed when organic material decomposes in the soil. Now, when he adds phosphate, there is no precipitate. The liquid remains clear—it's phosphate, is in solution, "free" and available to thirsty roots of plants.

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## The Market Place

# New machine rescues man from the labor of turning the compost heap by hand.

ORGANIC farmers who still find it expedient to compost in heaps, nursery men, greenhouse keepers, and mushroom growers will find solace in the fact that it is no longer necessary to turn the compost heap by hand.

A new machine has been developed that ably copes with the problem of handling, turning and aerating long windrows of manure and organic matter. While it would take three men approximately two days to turn a 100 foot windrow of potential compost, the compost turner moves along biting out two foot chunks per minute, chewing, moistening and spitting them out into a new heap as it goes. In the event that the compost is ready for distribution to the field, it can be discharged directly into the manure spreader.

The compost turner was developed by the Barbe-Greene Company of Aurora, Illinois.

While organiculture for some time has justifiably placed the accent on sheet composting, the compost heap has not entirely disappeared from the scene. Farmers and growers who have access to a year round supply of organic matter may wish to compost continually, or they may wish to continue the heap when the season does not permit the application of organic matter to the soil. This task is simplified with the Turner. It also offers business opportunity to those who have access to organic wastes such as city garbage, leaves or other materials. One could readily set himself up in the compost business, for this product always brings a premium price. However, whatever the reason for heap composting, it must

be remembered to construct the heap to avod maximum loss of nutrients.

### Home ground flour mill improves taste of baked goods

Today, with the emphasis on the nutritional value of whole grain flour, more people than ever are grinding their own flour. The Hol-Grain Milling Co. of Milwaukee,

Wisconsin, has developed a mill which is in reality a miniature of the historic old stone mill. Certain refinements have been made to produce a good baking flour without removing the roughage inherent in the flour by the old grinding method. The Harries mill grinds the grain into an extra fine flour.

### Geometric Hand Saw cuts time for wood working chores

Construction and repair work around the farm and home is often slowed down by the necessity of changing from tool to tool. A new device – the geometric hand layout saw – does away with this problem in the simplest of manners. It combines many tools in one and still remains surprisingly compact. The rounded blade edge enables the user to make accurate incision cuts while

the back of the saw acts as a level (with vial indicator). It is used as an inside square. The vial shows plumb position of the verticle piece or board. It is also a square, rule or straight edge. Manufacturers are The Belsaw Machinery Co., 315 Westport Rd., Kansas City 2, Mo.

Books

# Synthetic Milk and Honey

***Food Products*, Saul Blumenthal, Chemical Pub. Co., Brooklyn. 986 pp. $12.00**

"COW'S milk is a white opaque liquid having a butter-like odor and a bland sweet taste," Mr. Blumenthal observes in his chapter about milk and its derivatives. Avoiding any further indelicate reference to the animal origin of the familiar beverage, the author goes on to give several formulas for improving or replacing the natural product.

Honey, which in natural form is in oversupply, we learn from Mr. Blumenthal's chapter entitled "Basic Food Ingredients," may be imitated by adding two ounces of rose water and a dash of raspberry flavor essence (made of terpenless oil of cloves, one per cent solution of orris liquid, cinnamon oil, bitter almond oil, rose oil, phenyl ethyl alcohol, benzyl acetate, synthetic neroli, peru balsam, coumarin, vanillin, propyl acetate, amyl acetate, and alcohol) and six ounces of ethyl alcohol to two ounces of honey flavor essence (which is a compound of amyl valerate, pelargonic ether, ethyl acetate, phenyl ethyl acetate, ethyl butyrate and ethyl alcohol).

And a relatively simple mixture of butyric acid, ethyl butyrate, amyl butyrate and alcohol will produce the flavor of butter itself – that old-fashioned stuff which cow's milk is said to smell like.

These random selections from hundreds of "scientific, factory-tested formulas for making . . . commercial food products in the canning, flavoring, beverage, confectionery, bakery, condiment, dairy, meat, fish, and allied industries" by no means give the full flavor of the book. It may be supposed that these technical secrets were published for the trade alone, and not meant to be read by the uninitiated. However, Mr. Blumenthal, who is a fellow of the American Institute of Chemists, disavows any such thing. He states in his foreword, "This book is written for everybody interested in the preparation of food from the manufacturing plant executive, the food chemist, and the food salesman, right down to the housewife."

As for the organic farmer, that hapless producer of raw foodstuffs without benefit of chemicals might be completely bewildered by such a tome. If modern food must come out of test tubes and retorts to be

(*Continued on page* 63)


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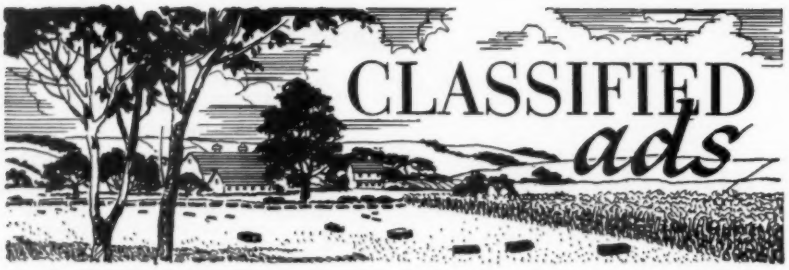


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# Books

(*Continued form page 61*)

edible, and old-fashioned foods must be turned into plastic steering wheels, or perhaps even into the manufacture of plastic retorts and test tubes, then the forlorn farmer may wonder where it is all going to end.

None of this is said in disparagement of Mr. Blumenthal's book. *Food Products* is a thorough, conscientious work, perhaps the most comprehensive ever published on present-day processing of food. The author maintains an objective attitude throughout, advising here just how much sodium benzoate the law allows in the preservation of pure apple cider or Maraschino style cherries, and there suggesting that only a small percentage of sulfur dioxide be used on dehydrated fruits and vegetables, and again warning that the government, "in order to minimize the consumption of the lead arsenate on fruits," will tolerate only certain amounts of lead and arsenic spray residues.

"When a person engages in the food business," Mr. Blumenthal explains with chaste forbearance, "he is apt to lose some of his feeling about food and treat it as any ordinary commodity. As a result he may become careless and handle the food he sells more carelessly than that which he himself eats."

The author leaves no doubt that he considers such an attitude reprehensible. He intimates, nevertheless, that the government is being rather finicky when "the presence of even a single rodent hair in a finished food product is regarded as sufficient evidence of filth to cause condemnation of the product."

"As a rule," Mr. Blumenthal concludes, "people are more or less fastidious concerning what they put into their mouths." He may be right. But if there is any conclusion to be drawn from his book *Food Products,* it is that people have grown more and more careless about what they will put into their stomachs. — G. M.


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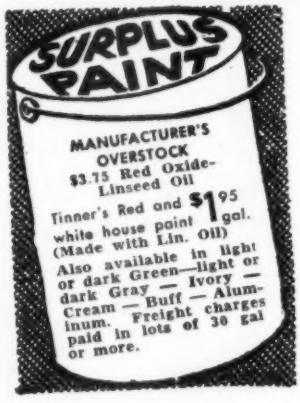
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*Poultry*

# Getting Ready for Winter

NOVEMBER is the month when forehanded poultry raisers get their flocks ready for the onslaught of winter. Sudden weather changes may be counted on any day, and poultry houses should be made ready for low temperatures. If the litter has become damp, it is much easier to clean the chickenhouse now and to put in fresh litter than it will be a few weeks from now.

Bear in mind that chickens can stand cold weather better when they are kept dry, and especially after they have got used to lower temperatures. It's the overnight change that hurts them. Try to protect them against November cold snaps. Proper ventilation of the chicken house is most important in winter. Make sure that windows can be closed before the blizzard strikes.

Adjust ventilation so that an even temperature can be maintained, and still allow enough motion of air to help keep the litter dry. Poultry growers who use deep litter may add fresh straw, ground corncobs, or wood chips on top of damp litter. Raw ground limestone should be mixed with the litter for best results. Hydrated lime and quicklime are caustic, and are not recommended for this purpose.

## Cover Crops

(*Continued from page* 41)

**Mung Bean** – April 1 to July 1; five to eight pounds in rows, 15 to 25 pounds drilled or broadcast; plant one inch deep.

**Cowpea** – April 1 to July 1; 15 to 20 pounds in rows, 30 to 40 pounds drilled, 60 to 90 pounds broadcast; plant one inch deep.

**Crotalaria** – April 1 to July 1; eight to twelve pounds in rows, 25 to 35 pounds broadcast; plant one inch deep.

**Guar** – April 1 to July 1; eight to twelve pounds in rows; plant 1½ to two inches deep

**Annual lespedeza** – February 15 to May 1; 20 to 35 pounds drilled or broadcast; plant zero to ½-inch deep

**Sericea lespedeza** – February 15 to May 1; 30 pounds of scarified seed drilled or broadcast, 50 to 60 pounds of unscarified seed drilled or broadcast; plant zero to ½-inch deep.

**Kudzu** – December to April; Seedlings or crowns: 500 to 1000 crowns per acre in rows; plant ½ to one inch deep. Seed: one pound of seed per acre in six foot rows, 1/3 to ½ pound of seed per acre in hills spaced six feet apart, each way; plant ½ to ¾-inch deep.

**Soybeans** – April 1 to June 1; small seeded varieties 15 to 30 pounds in rows, 45 to 60 pounds drilled or broadcast; medium and large seeded varieties 30 to 45 pounds in rows, 60 to 75 pounds drilled or broadcast; plant one to two inches deep.

**Velvetbean** – April 1 to June 1; ½ to one bushel in rows, two to three quarts interplanted with corn; plant two to four inches deep.

---

Four billion, two hundred million eggs were laid by hens on U. S. farms in the month of August this year – an all-time high record for the month, both in total number and in average production per layer.

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